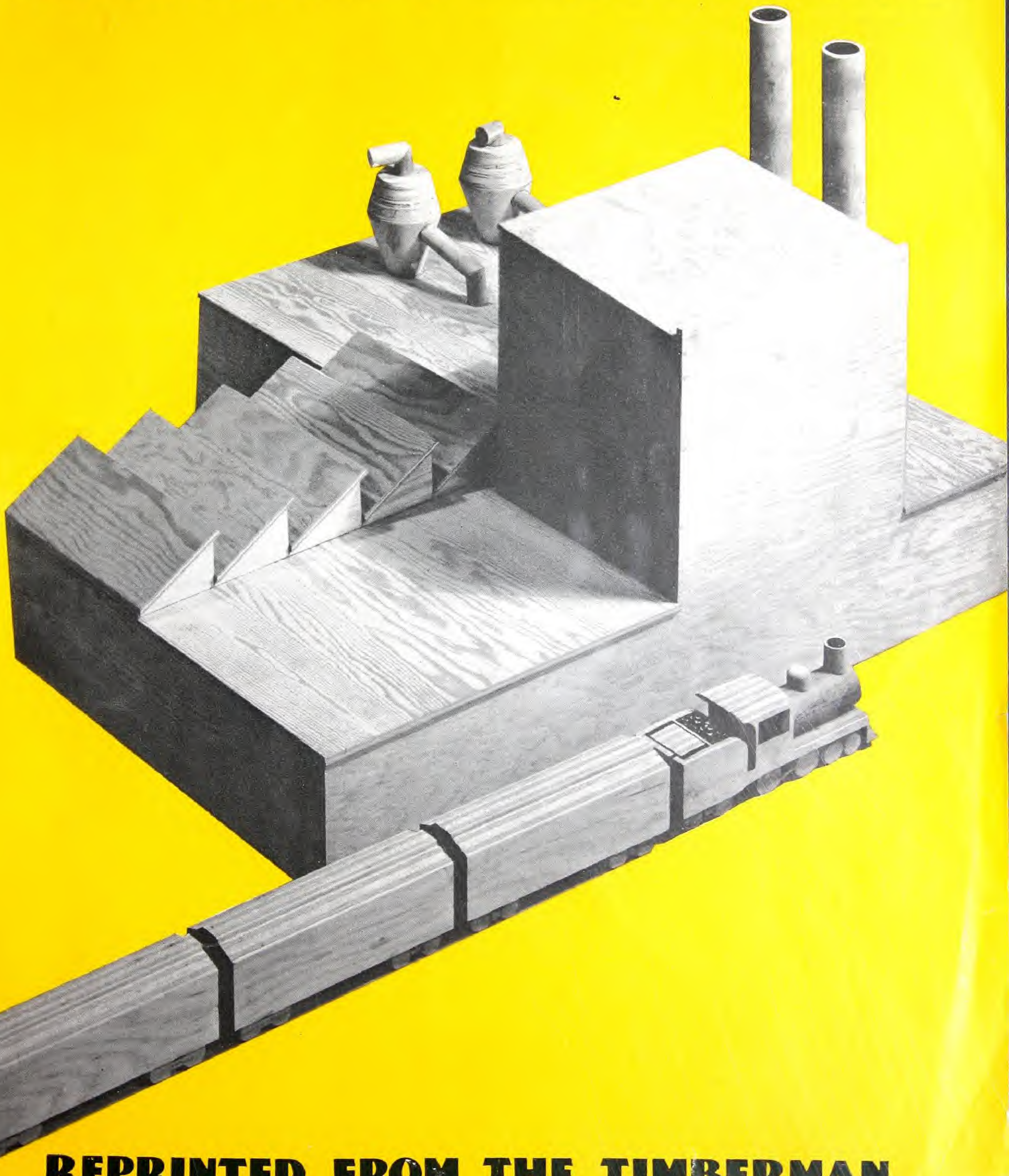
INDUSTRIAL USES FOR DOUGLAS FIR PLYWOOD



REPRINTED FROM THE TIMBERMAN

Foreword

THE MATERIAL in this booklet originally appeared in a recent issue of THE TIMBERMAN and is reprinted as a special addition to the library of plywood literature because these "cut-up" or industrial uses of the product illustrate tangibly its wide versatility.

Now that our nation is at war these uses of plywood take on an increasing importance since the miracle-in-wood has been called upon to solve many problems in the production of goods needed for war. It is not only that plywood makes possible faster construction of barracks, housing for war workers, industrial buildings, ships and many other structural units; it also solves packaging and crating problems, blacks out homes and plants, assists the farmer to increase food production through manifold agricultural uses, and works closely with the armed forces and war industry on literally hundreds of similar uses.

With all this, virtually all plywood is now going for war uses. And as long as the need remains, productive capacity of the industry will be earmarked for the war effort. The industry believes that its normal customers, now cut off from plywood, would not have the situation otherwise as long as the emergency lasts.

These industrial uses are presented in the hope that they will be thought-provoking, suggesting further applications of the material in individual industries. It is not suggested that these particular uses will be duplicated necessarily, but that they will indicate the manifold advantages of the material and point the way toward further product research as needs for a multi-purpose material arise.

DOUGLAS FIR PLYWOOD ASSOCIATION

Plywood Speeds Car Construction

SPLENDID staff organization and fine teamwork on the part of the construction crew, plus time-saving Douglas fir plywood lining sheets, enabled the Renton shops of the Pacific Car and Foundry Company to establish a remarkable record for the delivery of 1000 new refrigerator cars for the Pacific Fruit Express Company during the last four months of 1941.

Every 40 minutes, a brand new steel car lined with Douglas fir plywood rolled off the assembly line at the big Renton car works. At various stations 600 skilled workmen pressed wheels onto axles, fitted them to trucks, hung metal sides on steel framing, lowered on the roofs, drove thousands of rivets and installed the insulation and plywood lining. Twelve times a shift a whistle would blow and 100 cars would move up a notch. At the final spot a finished car, complete even to lettering on the sides, was shunted onto a spur, ready to go into service.

In the lining of each new refrigerator car went 3000 square feet of exterior Douglas fir plywood, supplied in sheets cut to exact size at the factory in both 5- and 7-ply thicknesses, and furnished with a shiplap joint. In addition to the plywood serving both as insulation and service walls, specifications called for one layer of reflective insulation laid against the steel framing, next three inches of hair felt padding, then one layer of aluminum foil and finally the plywood lining. Ceilings were insulated with three inches of fiber glass and half an inch of insulating board, placed between the plywood lining and the steel roof sheets.

Floors were insulated with three and a half inches of hog hair over which went the Douglas fir T&G car decking, which in turn was covered with waterproof felt. Wooden grilles form the loading floor, placed about six inches above the car deck to permit adequate ventilation of the cargo. All car interiors received a final coating of varnish.

Frank E. Stewart, plant superintendent of Pacific Car and Foundry Co., supervised the construction details. Departments requisitioned to aid in the work were forge and steel shops, foundry, mill, motor coach shop, paint and sheet metal shops. In the thick of the undertaking was George Hisey, general car foreman, working directly under Mr. Stewart. J. E. Bengston is the company's chief engineer.

E. P. Wright, chief inspector on the job for Pacific Fruit Express, was sent from the Roseville, California, shops to

(Continued on page 6)

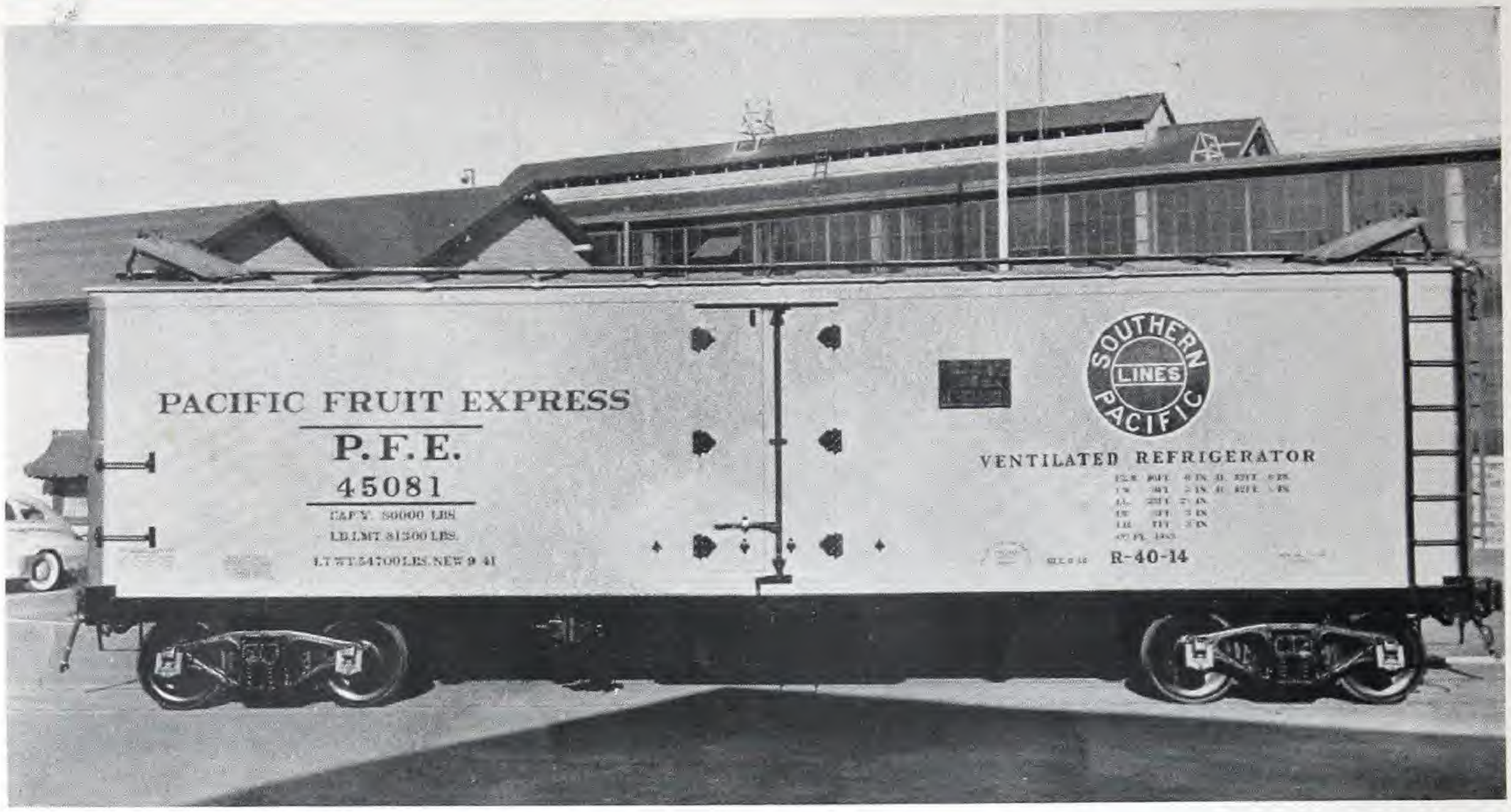
J. E. BENGSTON, Carco Mechanical Engineer

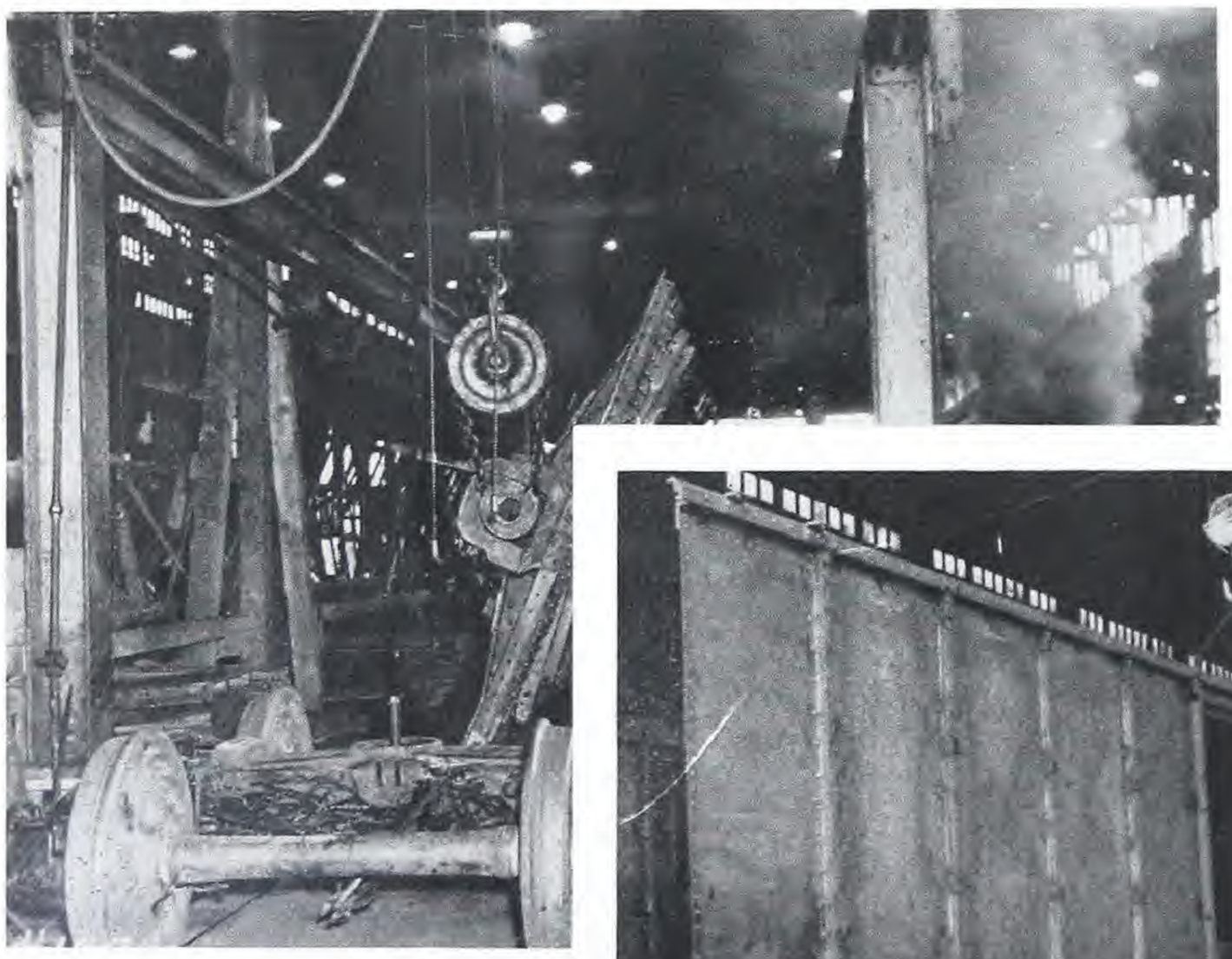
FRANK STEWART, Carco Plant Superintendent

GEORGE HISEY
Carco Foreman

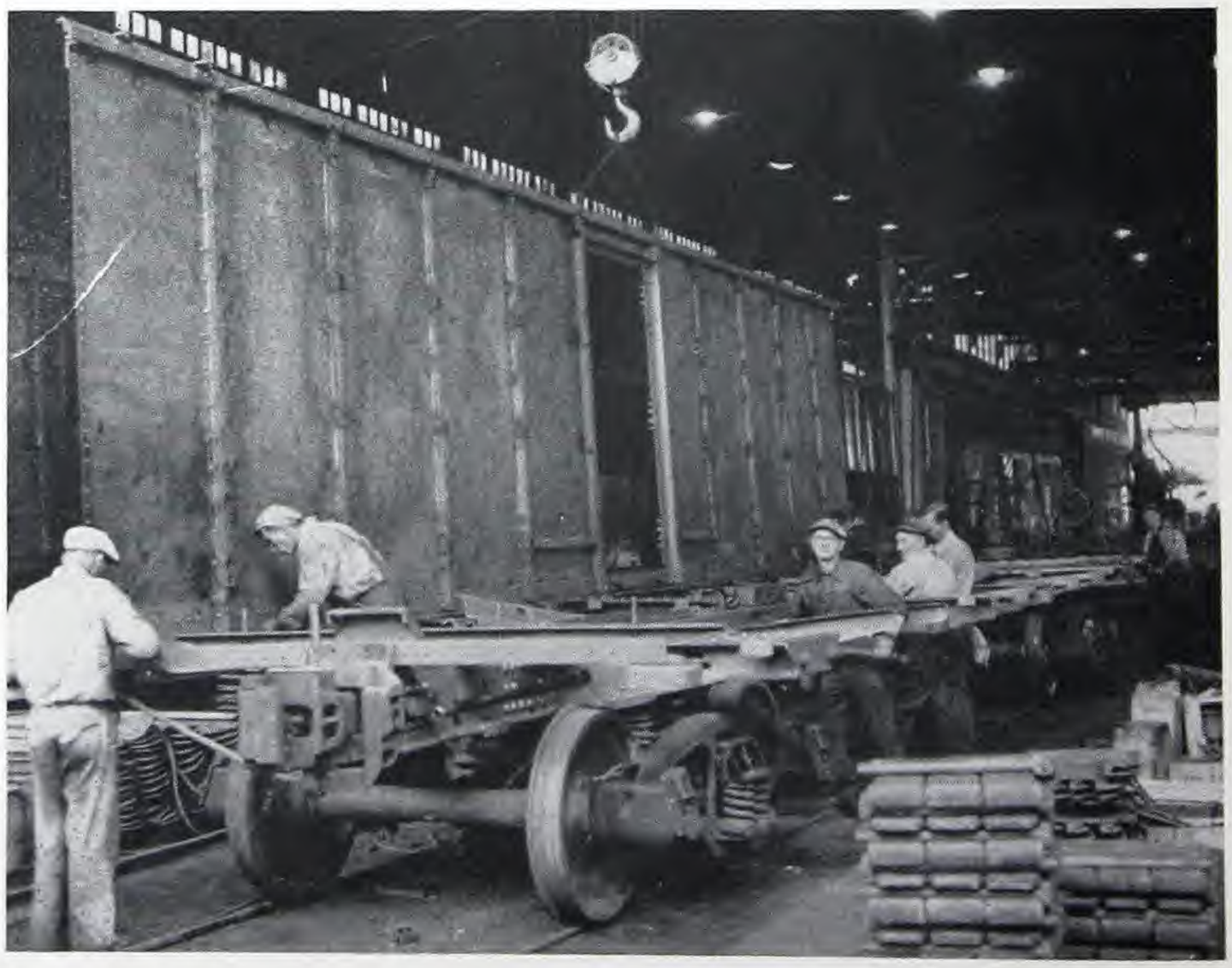
E. P. WRIGHT
PFE Inspector

STEPS IN THE FABRICATION OF A MODERN REFRIGERATOR CAR





One thousand plywood lined refrigerator cars of this type were delivered to the Pacific Fruit Express Company by the Pacific Car and Foundry Company, Renton, Washington, during the last four months of 1941. Each car is rated at 40 tons capacity; is 42 feet long, and required 3000 feet of exterior grade plywood for lining and ceiling. Frame and exterior siding are steel.

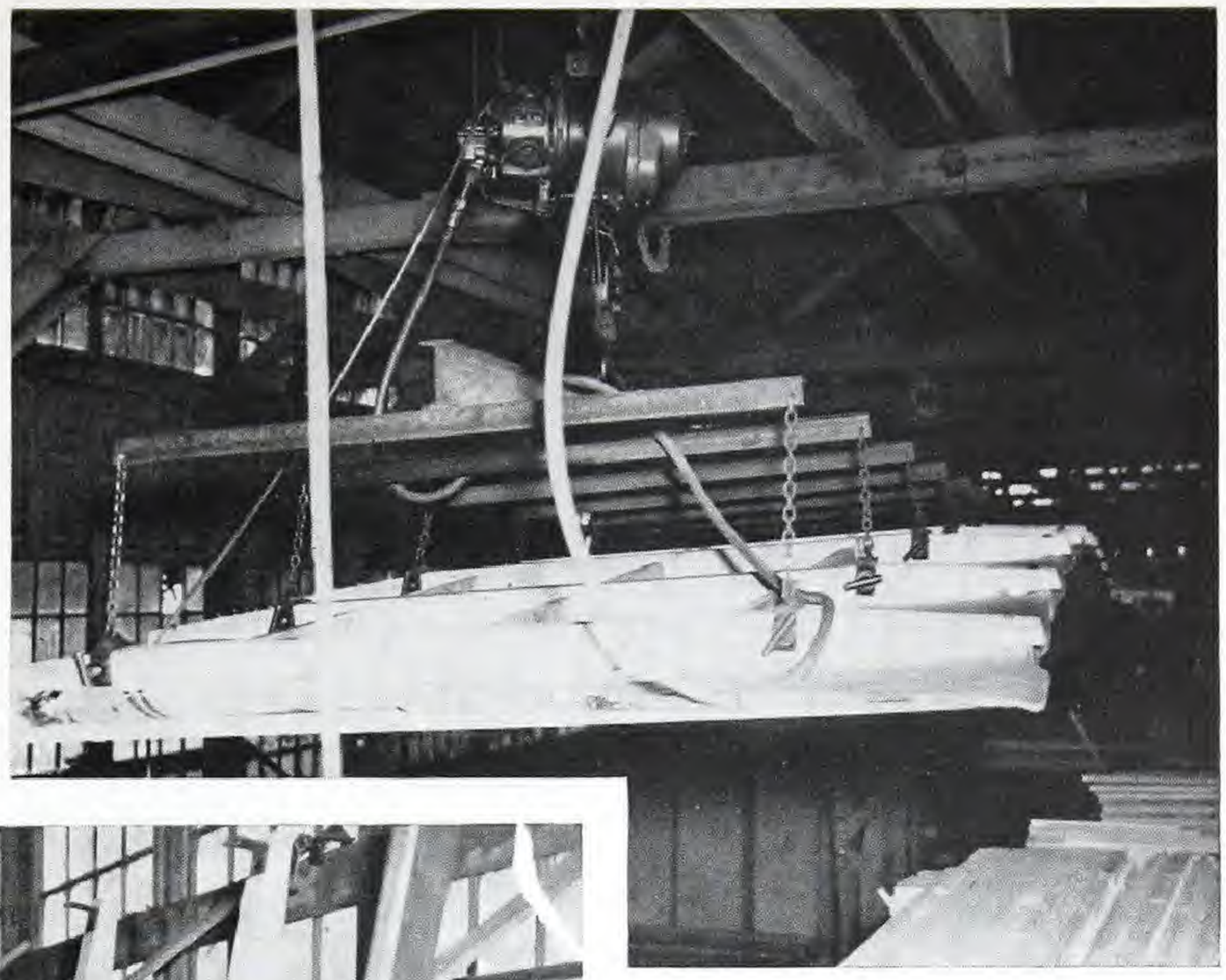


(Above) The first step in the building of a refrigerator car is the truck assembly. Each operation was performed at definite station, and the car moved forward every 40 minutes to a new spot.

(Right) The steel sides are being lowered into place, after the running gear has been assembled at a previous station on the long assembly line.

LOWERING THE CEILING

(Right) Lowering the plywood ceiling into position. Between the roof and the plywood ceiling lining, went three inches of fiber glass and half an inch of insulating board. Each section, as quickly as it was completed, was swung by overhead cranes into position ready for assembly. Sectional prefabrication made it possible for crews on the assembly line to operate smoothly and without loss of time.

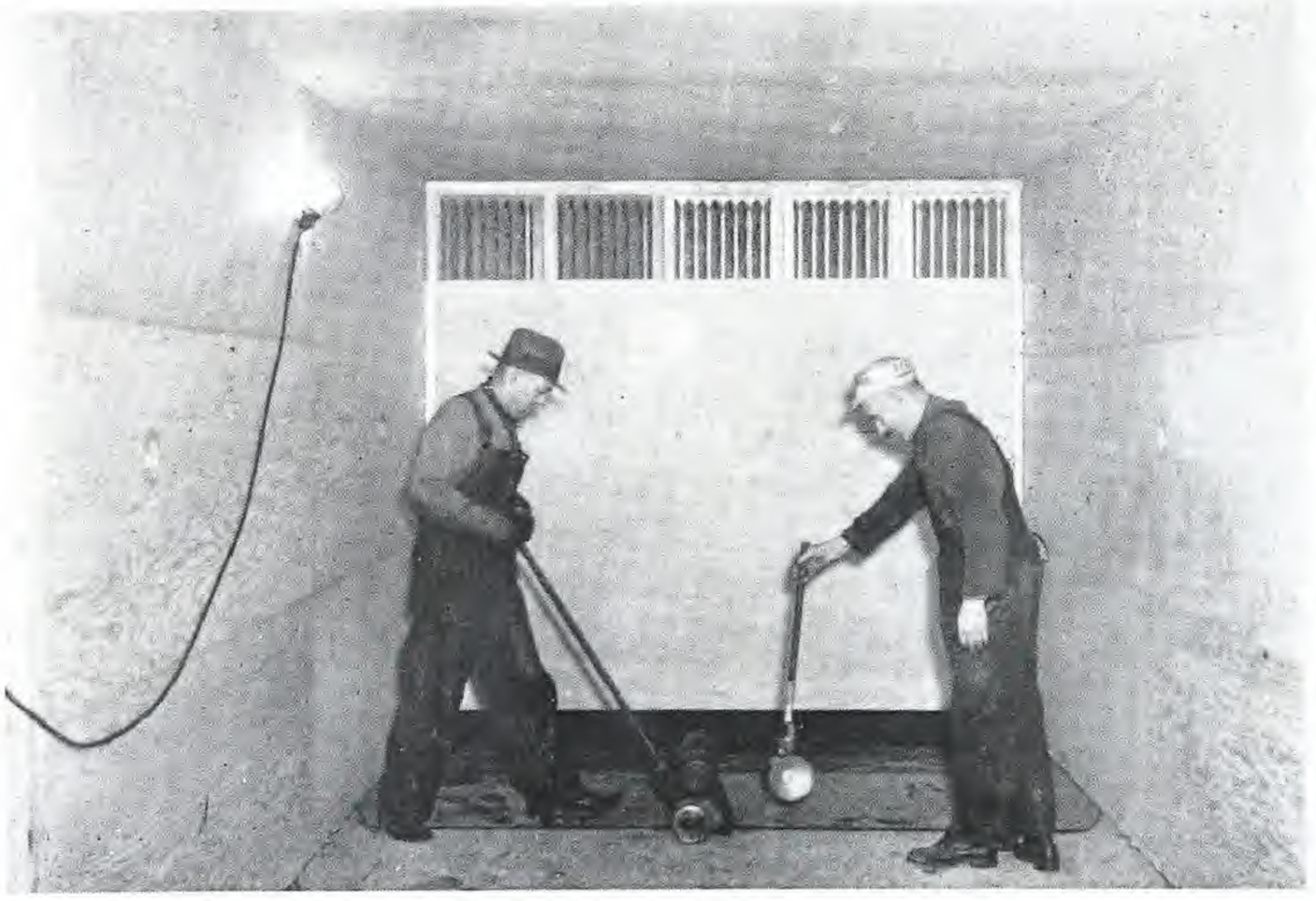


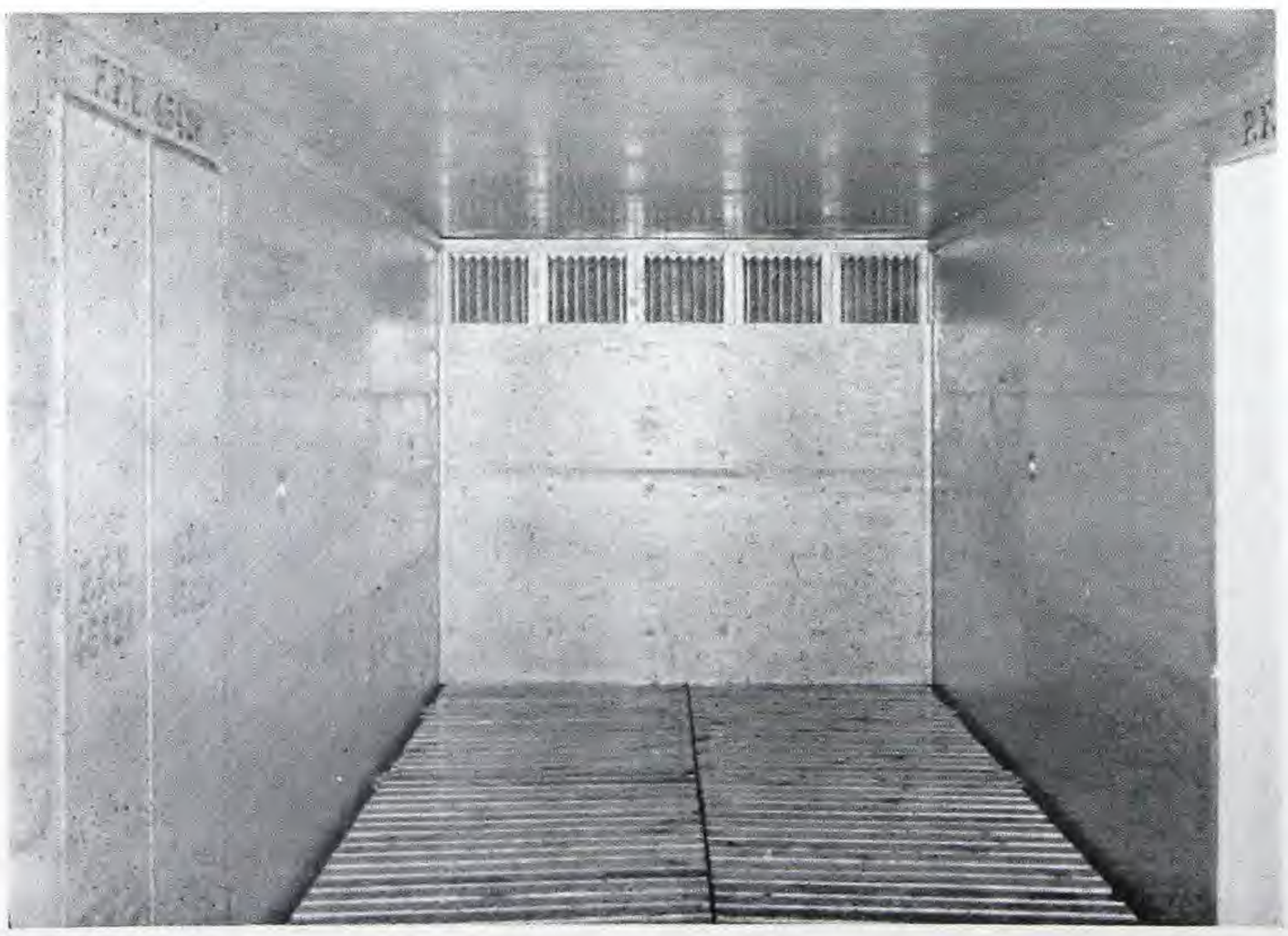
ASSEMBLING ON THE JIG

(Left) Workmen are here shown on the ceiling jig, putting together the plywood panels to form the inner roof of the car. The panels were cut to size at the factory, thus eliminating cutting and fitting on the job, which proved a big factor in the delivery of the big order within the time limits of the contract. Panels were furnished with a shiplap joint.

COMPLETING THE LINING

(Right) At this station on the assembly line, the insulation material has been applied and the work of laying the fir decking is in progress. The sidewall insulation consists of three inches of hair felt, placed between a layer of reflecting paper and a layer of aluminum foil, both acting as reflective insulating materials. The floor has three and one-half inches of hog hair insulation under the sawn decking.





Car Every 40 Minutes

(Continued from page 3)

represent the carrier. Incidentally, he was foreman at Roseville when Pacific Fruit Express built its first all-plywood car in 1939. Mr. Wright sums up the advantages of plywood in car construction as follows: Greater lateral strength; equal or greater life; saving in weight; a tighter car; and in general, a better looking car.

These 1000 new refrigerators, which have already gone into service on the lines of Southern Pacific, Union Pacific, Western Pacific and Texas & New Orleans, were designed by G. P. Torburn of the San Francisco office of Pacific Fruit Express, now assistant general superintendent. This company, largest handler of perishable goods in the world, has approximately 20,000 refrigerator cars in service. South bound after leaving the Renton shops, the new cars carried full loads of apples and other Northwest produce.

The material list for the 1000 plywood lined refrigerator cars, involving an investment of $5,000,000 on the part of the carrier, included: 9800 tons of rolled steel; 500 tons of bolts and rivets; 3,900,00 square feet of Douglas fir sawn lumber; 3,000,000 square feet of exterior type Douglas fir plywood; 120 tons of paint; 1,014,000 bolts; 4,177,000 rivets; 7,807,000 nails; 1,082,000 wood screws; 20,000 gallons of emulsion; 102,000 gallons of metal paint; 700 tons of miscellaneous castings; 1800 tons of truck castings.

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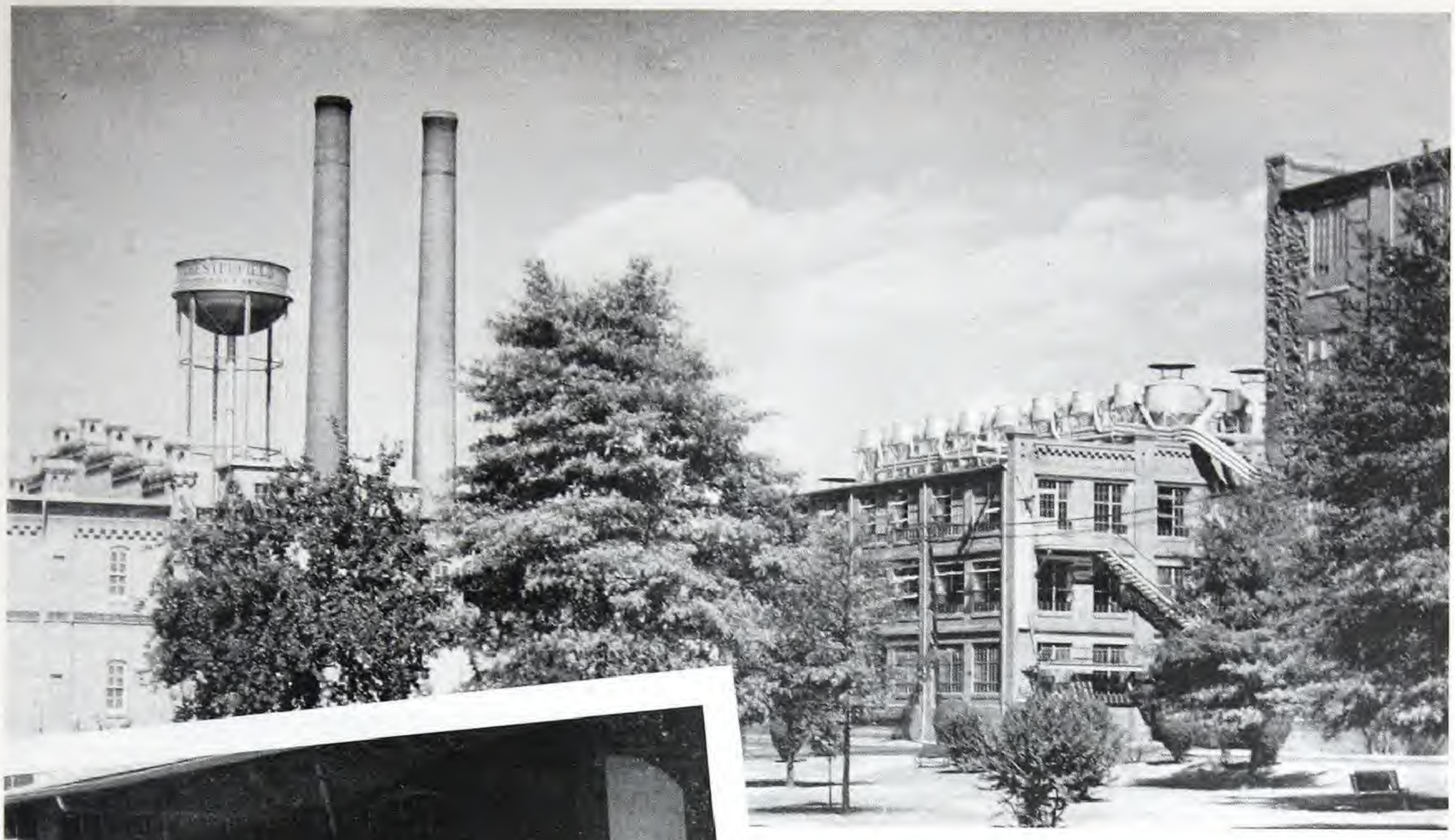
(Top) Workmen nailing the plywood lining in place. Coming in big, precut sheets, the task of lining these cars involved minimum of labor.

(Center) Two layers of heavy waterproof felt paper are laid over the Douglas fir decking, and mopped with asphaltum. The car is almost complete, except for the installation of the floor grilles on which the load is carried.

(Below) A view of a completed car, showing the smooth, even surfaces presented by the Douglas fir plywood lining. For cleaning, the ventilating floor grilles are raised on their hinges and hooked to the sides of the car. Ice compartments lay behind the plywood walls at either end of the car.



Photographs by Peter Ward

PLYWOOD *in* TOBACCO LAND

Douglas Fir Plywood Revolutionizes the Tobacco Hogshead

LEAF TOBACCO is handled, prior to its manufacture into cigarettes and smoking tobacco, in wooden hogsheads large enough to contain about 1000 pounds of compressed tobacco. Formerly the hogsheads were constructed of individual pine or oak staves with heads of the same material and the usual metal or wooden hoops and hardware. No satisfactory substitute has ever been found for wood for tobacco containers during aging, but within the past two years tobacco hogsheads have undergone a marked change due to the introduction and use of Douglas fir plywood for staves and heads. This change to plywood also permitted other improvements in the construction and design of tobacco hogsheads.

The Douglas fir plywood hogshead, as now perfected, is a prefabricated container of the same size as the old style hogshead. A hogshead consists of Douglas fir plywood staves formed into two interchangeable mats each of which is exactly one-half of a hogshead. When two sides are joined together by metal pins at the ends of their metal hoops and the heads are inserted, a complete hogshead is formed. The heads, made of Douglas fir plywood, are cut to fit exactly in each end of the hogshead.

Liners or small strips of plywood are nailed to the ends of each stave to give additional thickness, thus preventing the heads from coming out under pressure from the compressed tobacco within. Each head has a circular oak band nailed to it so that it will fit snugly against the liners to give the stave ends protection when hogsheads are handled and raised on end.

The steps in transporting, handling, and storing leaf tobacco in which the use of hogsheads is necessary are, briefly:

1. Packing undried tobacco in hogsheads at or near warehouses where tobacco is purchased.

2. Transportation of the undried leaf in hogsheads by truck or rail to a central re-drying plant.

3. Unpacking the undried tobacco and re-drying it to the correct moisture content.

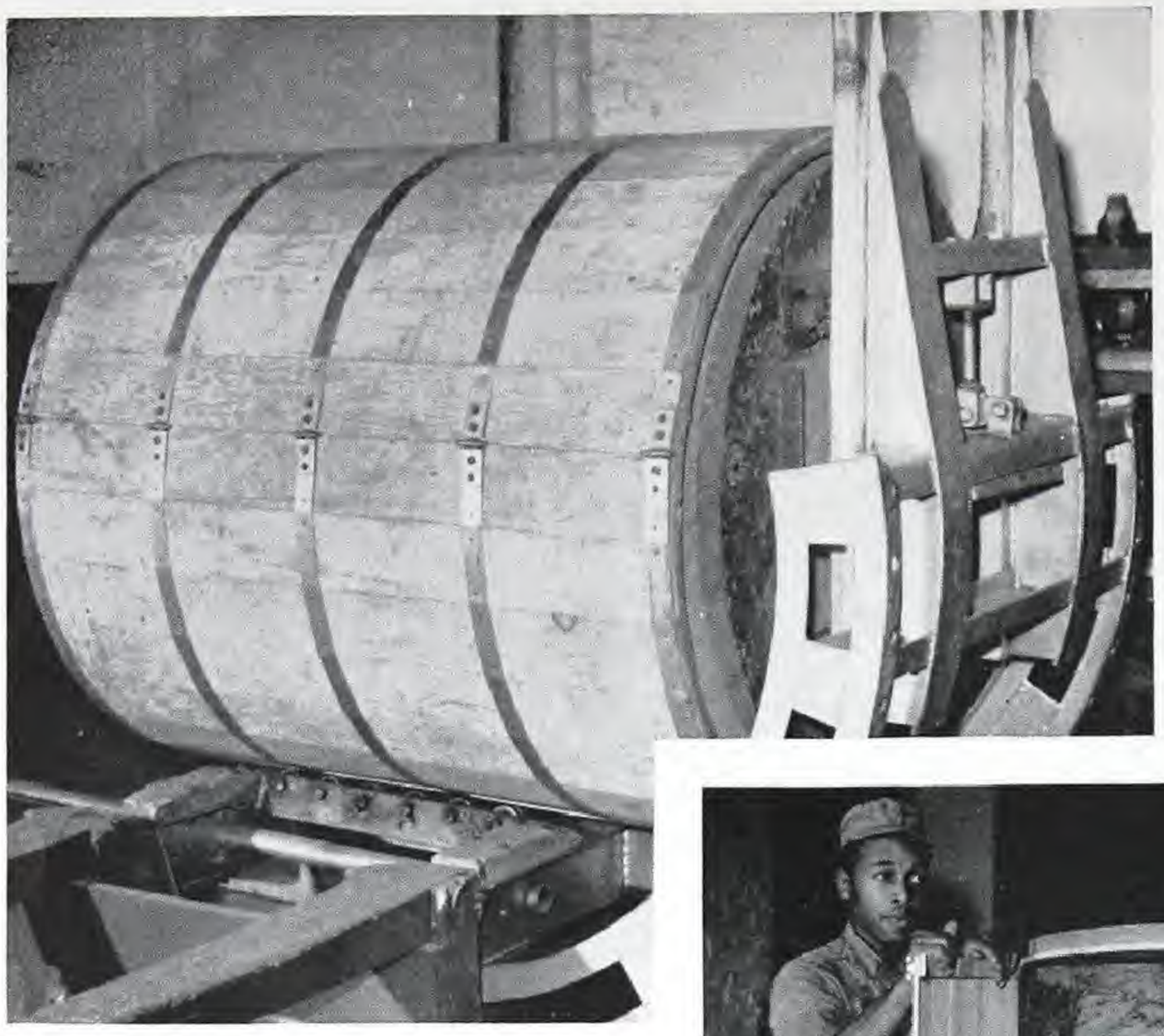
4. Packing the re-dried tobacco into hogsheads.

5. Storage in the hogsheads for at least two years in specially constructed warehouses.

6. Unpacking at a stemmery where moisture is added to the tobacco to remove brittleness so that the stems can be removed.

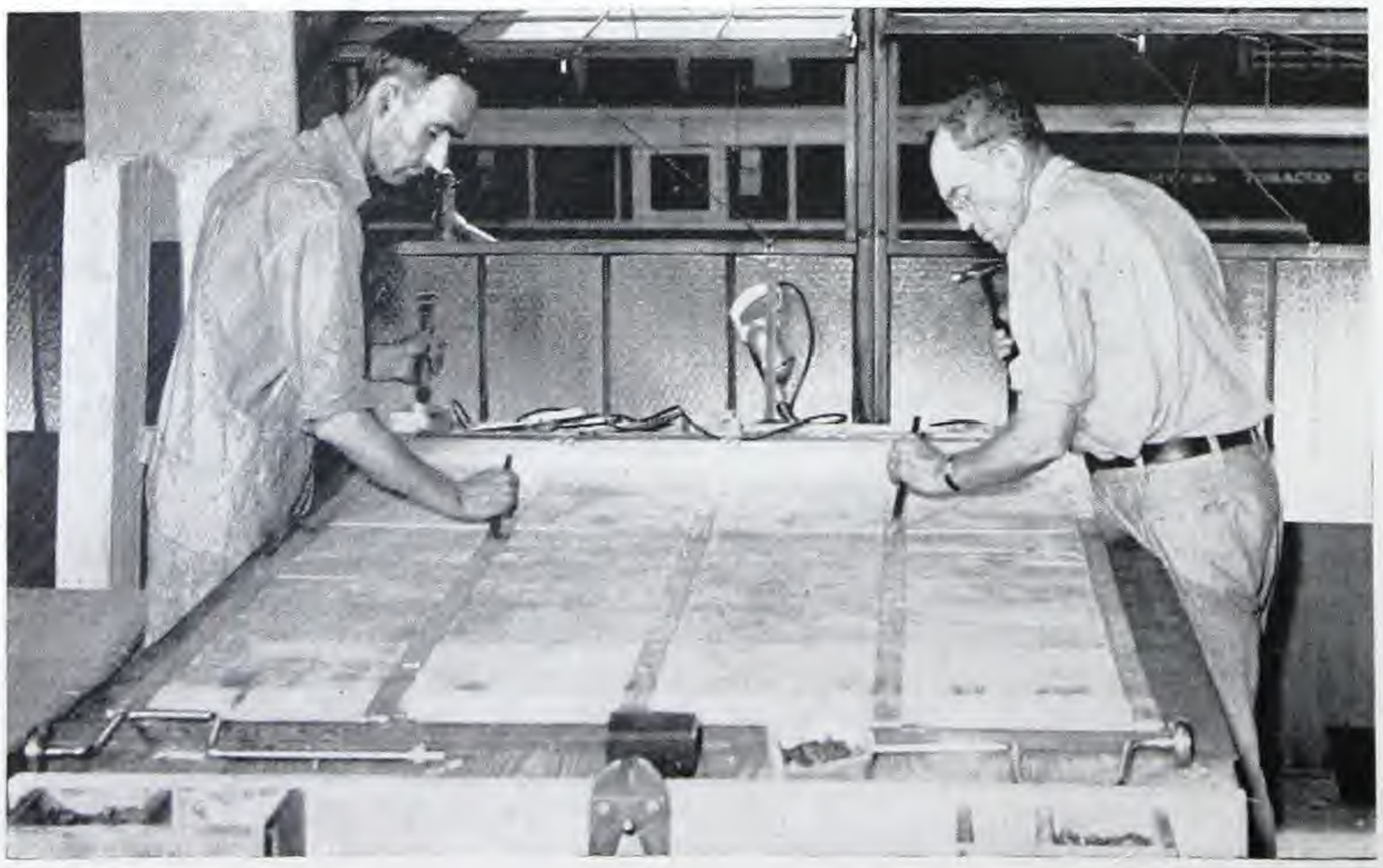
7. Re-packing the stemmed tobacco in hogsheads for shipment to tobacco factories making cigarettes and smoking mixtures.

DOUGLAS FIR PLYWOOD IN TOBACCO LAND



After a hogshead has been rolled into the factory it is up-ended and placed on a round base with rollers as shown in this illustration. The device shown will rock the hogshead to an upright position without putting weight on the ends of the staves which is their weakest point. The rollered base is already in place on the right end of the hogshead shown in illustration.

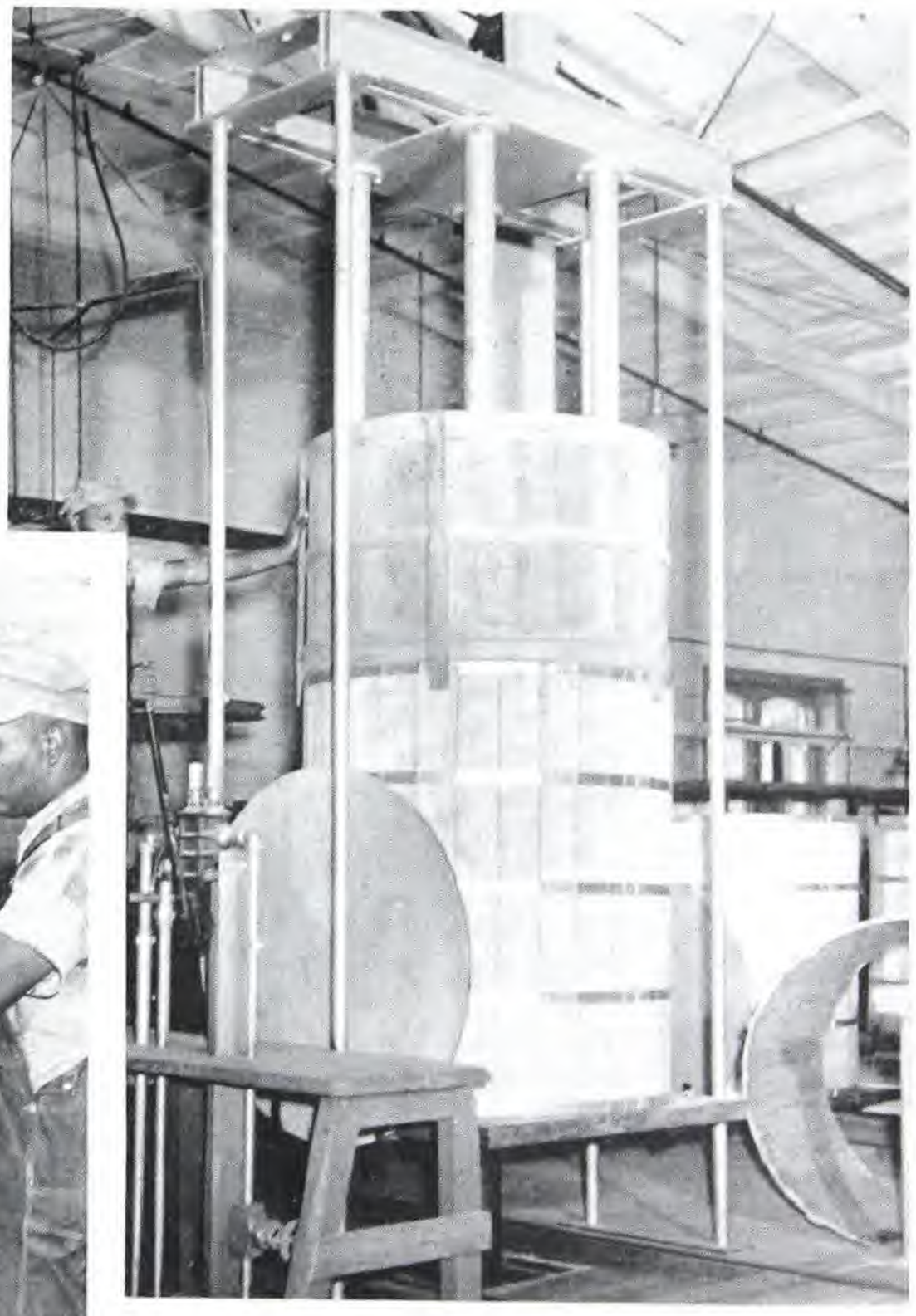
After the hogshead has been up-ended on a castered base, as shown, the pins holding the two sides together are removed and the hogshead taken off the tobacco. This permits the top head to be removed. Note the plywood liners on the ends of the staves on the inside as shown on the left side. Another set of bolts and pins on the back side is also loosened permitting the hogshead to be removed in two sections.



The two sides of each hogshead are inspected by two coopers who replace broken or badly damaged staves, liners, and other parts of the hogshead while it is in a knocked down condition. Broken staves are salvaged for use in making heads. The broken sections of stave are nailed-up crosswise over other staves in the head and cut to shape.

DOUGLAS FIR PLYWOOD IN TOBACCO LAND

When the sides and heads have been inspected and, if necessary, repaired, they are assembled by replacing the pins through the hoop hinges and inserting the bottom head. Two men are shown with large clubs pounding the bottom in the upright hogshead. It is necessary to force the bottom head in place because of the tight fit that is required.



The repaired hogshead is filled with tobacco by placing a temporary extension section over the top end and pushing the entire load into the hogshead enough times to get about 1000 pounds in it. To accomplish this the hogshead is raised up against a plunger about as large as the hogshead.

After filling and weighing the top head is inserted by loosening the three top hoops and inserting the head below the liners. The compressed air operated ratchet pulls the hogshead back together so that the hoop hinge pins can be inserted.

DOUGLAS FIR PLYWOOD IN TOBACCO LAND

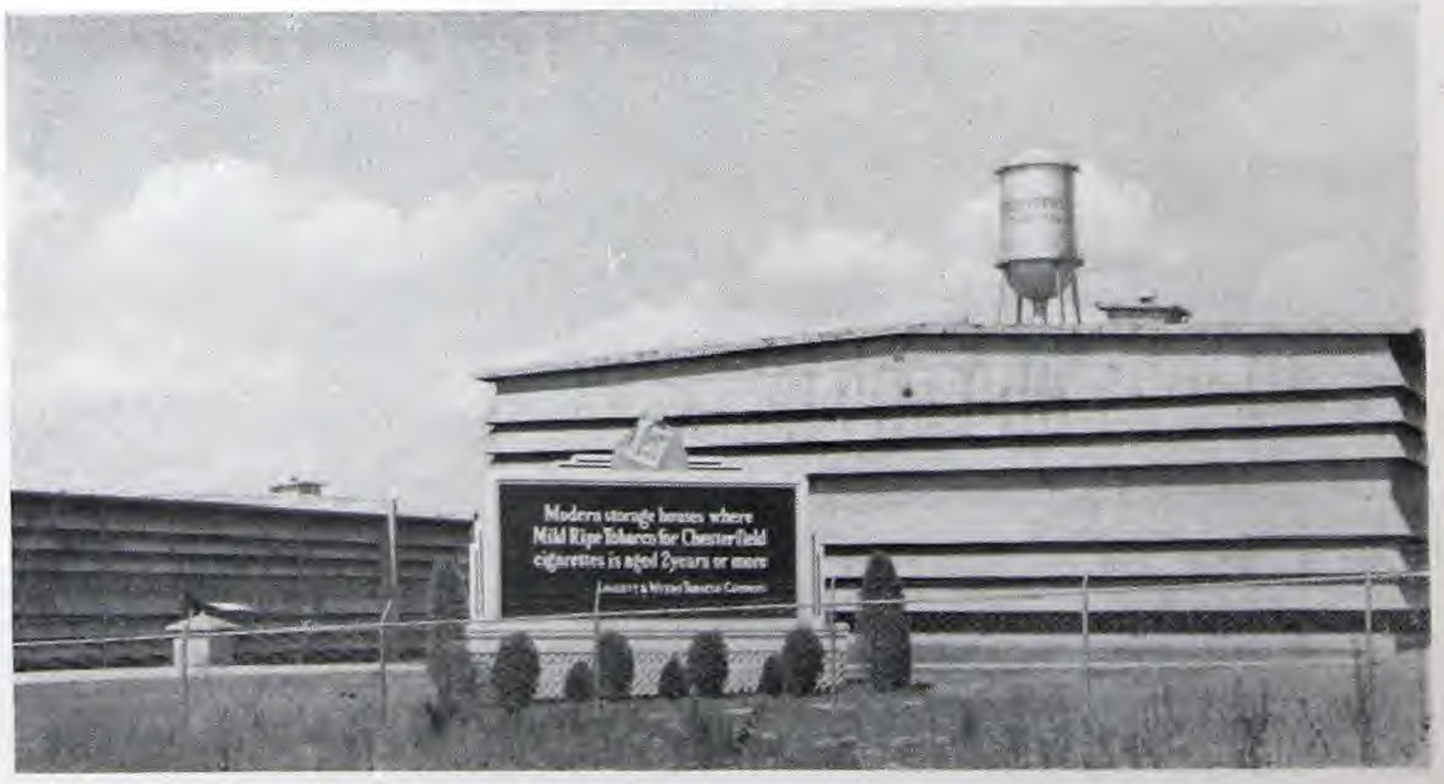
Douglas fir plywood hogsheads such as shown here store easily and compactly in tobacco storage warehouses. Hogsheads of tobacco are stored like this for at least two years.

The importance of using hogsheads that can be easily and economically packed and unpacked without undue damage is evident from this brief resume of the part hogsheads play in the tobacco industry. With the old style pine or oak hogsheads each unpacking required that the hogshead practically be rebuilt in a cooper shop. When one was filled the head had to be nailed in place and the hoops nailed on. With Douglas fir prefabricated hogsheads, this process is greatly simplified and the nailing entirely eliminated which not only saves labor and time, but reduces the possibility of getting nails in the tobacco.

Formerly when tobacco was shipped to the factory from the various markets, the pine hogsheads had to be assembled from staves and heading boards at the shipping point. Both reclaimed and new staves were used. The plywood type of prefabricated hogshead, each consisting of two half sections and two heads, are sent to the purchasing market in a knocked-down condition. It is an easy matter to assemble the hogsheads because all sides and the heads are interchangeable and all that is necessary is to slip pins through each of the hoop hinges and place the bottom heads in the hogshead, leaving the top to be placed in after filling. This is done by removing the top three pins which permits the hogshead to spread enough to slip the top head beneath the liners on the end of the staves. Then by means of an air-operated ratchet the hogshead is squeezed together and the pins replaced. It is then ready for shipment to the re-drying plant. Subsequent refilling operations are done in same way.

When a hogshead is unpacked it is taken apart and the two sides and heads are checked and, if necessary, repaired. This is easily done by inserting new staves or nailing on new liners wherever necessary. Only a small percentage of the plywood hogsheads need repairing after each use as compared to 100 per cent for the sawn stave type. Broken or damaged plywood staves are salvaged and nailed together in two crossed layers from which new heads are cut. This keeps actual waste to a very small amount.

The magnitude of the tobacco hogshead industry is indicated by the amount of the annual tobacco crop. The average annual tobacco production for the United States as a whole totals 1,325,000,000 pounds. For North Carolina and South Carolina alone it is 558,663,000 pounds, and for North Carolina, the state with largest production, 481,939 pounds. Some states such as Georgia and Florida do not pack undried tobacco in hogsheads for shipment to re-drying plants but handle it in burlap. A conservative estimate, therefore, of the tobacco moved from market in hogsheads would be that from North Carolina and South Carolina. Since each hogshead contains 1000 pounds, then this means that 558,663 hogsheads must be filled within a few weeks' time each fall to move the annual tobacco crop from these two states to the re-drying plants.



This is an exterior view of a tobacco warehouse of the Liggett & Myers Tobacco Company near Durham, N. C.

Even the tobacco arriving at the redrying plants in containers other than hogsheads is handled and stored in the usual way with hogsheads. Practically the total production of the United States, therefore, even if it does not move from market in hogsheads is handled and stored in them.

All of the tobacco manufactured into Chesterfield cigarettes at the large Liggett & Myers Tobacco Co. factory in Durham, North Carolina, is obtained from hogsheads that have been in storage two years or more. The unpacking of undried leaf tobacco in the leaf season, the stemmery packing and unpacking operations, and other handling are in addition to the cigarette factory operations. It is evident that the advantage of plywood, prefabricated hogsheads over the old type is very real and important.

The detailed specifications for collapsible hogsheads as used by the Chesterfield Company and instructions for assembling and handling them are as follows:

Specifications for Hogsheads

30 STAVES: 5/16″ thick by 4-27/32″ wide by 54″ long, 3-ply Douglas fir plywood, unsanded, no pitch. No excess glue exposed. First quality water resisting glue to be used. (When assembling use a 20-gauge metal separator between staves.)

2 HEADS: 7/16″ thick, circled to 46″ diameter, 3-ply Douglas fir plywood, unsanded. First quality water resisting glue to be used.

1 CIRCLED OAK BAND: 3/4″x1-1/4″x11′ 9-1/4″ D4sides, to be attached to head with 2″ nails ½″ from edge of head. (Nails to be cleated.)

60 PIECES FOR LINERS:7/16″ thick by 1¼″ wide by 4⅝″ long, 3-ply Douglas fir plywood, unsanded. (Liners for end of staves to be nailed to both ends of each stave with two 1¼″ trunk nails.)

HARDWARE: 10 galvinized coated bands, 20-gauge (1½″ wide by 72-⅝″ long, punched to detail.)

10 Pairs hinges, 14-gauge iron, consisting of a male and female member riveted to ends of bands with ¼″ rivets with center of eyes 73⅜″ center to center. Pins bored for cotter keys size 3/32x-½″, supplied with hinges. Hinges to be painted to match galvicote bands same as furnished on previous order.

116 1¼″ trunk nails to be used on both end bands.

90 ⅝″ trunk nails to be used in three middle bands in each stave.

12 ¼″x¾″ carriage bolts to be used on middle bands.

8 ¼″x1¼″ carriage bolts to be used on end bands.

Instructions

List of Equipment

1 Hammer

2 Wooden headsticks for forcing bottom head in place

2 Pin removers

1 Steel ratchet for closing hogshead when filled

2 Steel head-tools for putting in top head

Setting Up Hogsheads

1. Place two sides on floor or table, side to side, so that hinges meet. Put steel pins into hinges with heads of pins all pointing one way.

2. Pull two remaining sides of hogsheads together, making hinges meet as above, and put in pins in the same manner.

3. Set hogsheads up on bottom end with heads of steel pins pointing up. Drop the bottom head into hogshead with the liner on head on outside, and hammer into position with wooden headstick.

4. After hogshead has been filled to required weight, press tobacco low enough so that head will go below liners on staves easily. Then remove three top pins on one side of hogshead, insert head on side of hogshead where no pins have been removed, first. Force head in with head tools kept in position so that steel disc on head tool lies flush on top of head and against the oak liner. This will prevent chipping of edges of the head, and if worked correctly, heads can be inserted without much pressure, and with no damage to the heads.

5. Draw hogshead together with steel ratchet and insert three pins which were removed to put in head.

Careful Handling Essential

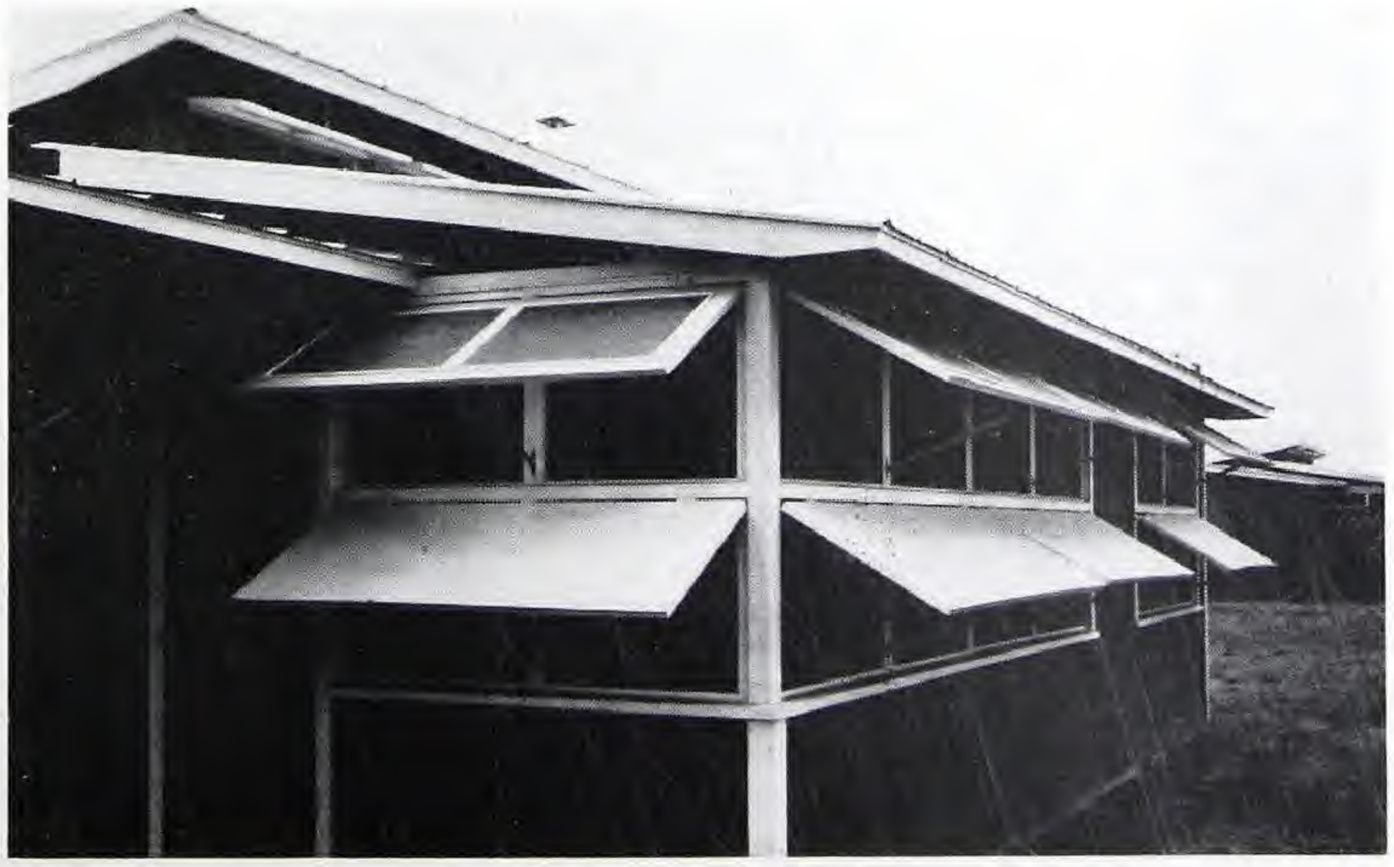
Care should be taken never to let the end of one hogshead fall against the side of another. While the ends of this hogshead are very strong, the sides just under the ends are its weakest part.

In loading for shipment be certain that ends of front and rear hogsheads are resting on bed of truck, and if piled two high, that bands of hogshead on top row are exactly over bands of hogshead on bottom row.

These hogsheads are made of light, thin material and will not stand rough treatment.

DOUGLAS FIR PLYWOOD USED IN FSA HOUSING UNITS

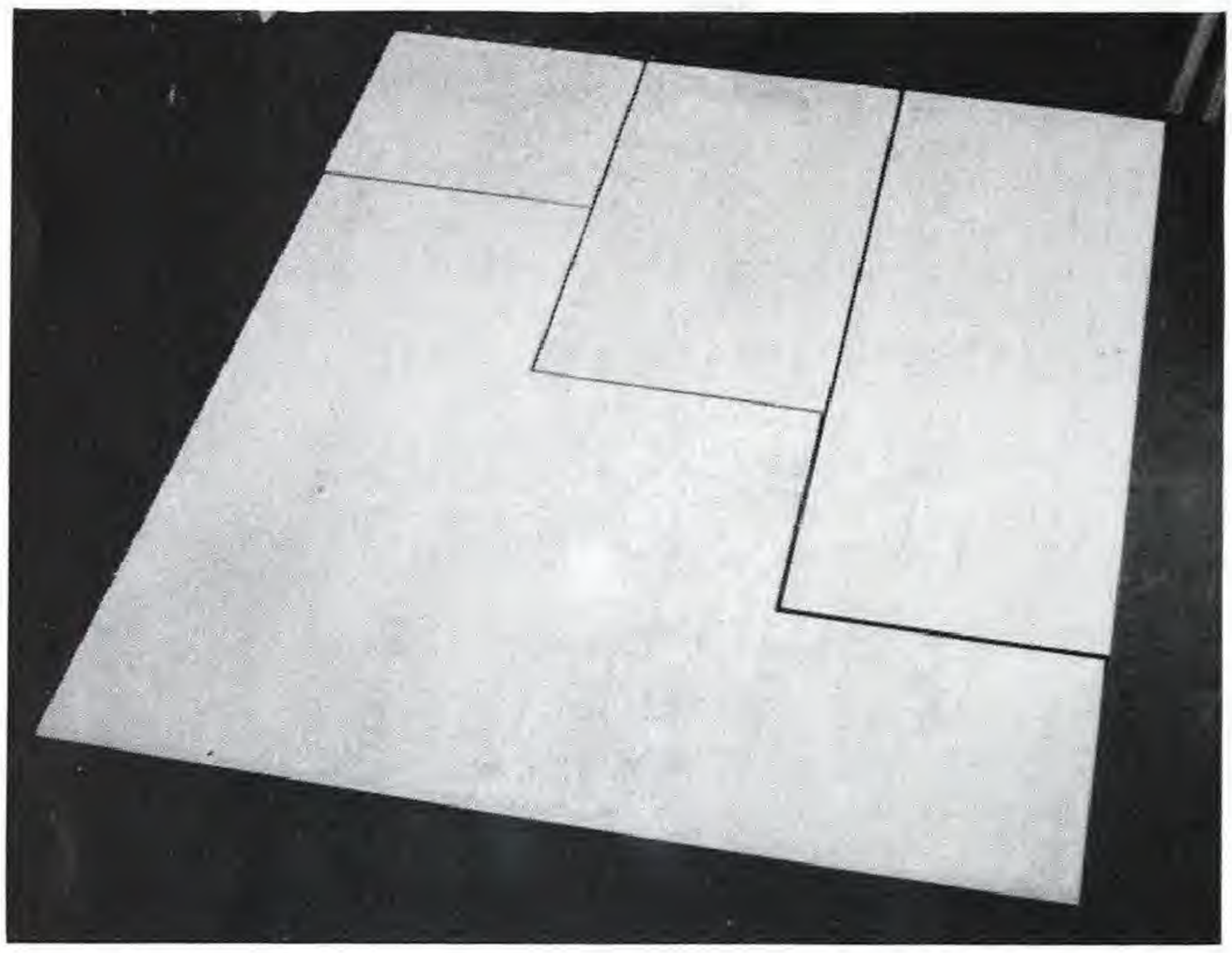
(Left) Tent house frame of exterior plywood is readily demountable for relocation. This unit was designed by FSA for the use of migrant workers.



(Right) Extra ventilation in hot climates is provided through use of exterior plywood flaps in this FSA house at Visalia, California.

PORTABLE BLEACHERS EVOLVED FROM PLYWOOD

Portable bleachers, surprisingly enough, have helped to build morale in the United States Army that so recently and so abruptly was called upon for active service to defend our way of life. For these bleachers, and they were built of fir plywood for strength with minimum weight, made it possible for photographers to take group pictures of various contingents of Army personnel.



Bleacher in the making. This plywood panel, three feet wide and four feet long, has been cut in step manner to form a support for bleachers to hold soldiers assembled for photographs.

Simple standard. This is the completed support ready to be carried to the drill field to form bleachers.

DURING the past summer, photographers of Associated Photographic Service at Tacoma, Washington, have visited various forts and air fields of the Pacific Northwest to assemble from 20 to 300 men in groups for photographs. Although these pictures were sold to the soldiers, Army officers granted permission to the photographers to take the pictures not because they could gain a reasonable profit, but primarily because group photographs help build soldier morale. Soldiers often send the pictures to their mothers, wives, and sweethearts.

Basic problem that confronted the photographers in arranging the groups of soldiers was to get them assembled close together so the photograph would reproduce clearly the face of each man. Logical answer was to arrange a tier of benches so three or four rows of soldiers could be seen clearly in each picture.

Naturally, only a minimum amount of time could be allotted to the picture taking, so bleachers had to be developed that could be erected and demounted easily and rapidly.

Plywood panels came into the picture-taking setup because they could easily be cut into simple hinged supports for planks that would form the desired bleachers. Three-fourths-inch plywood panels three feet wide and eight feet long were selected to do the job.

First the panel was cut in half leaving two pieces each three by four feet. The smaller piece then was cut in step fashion to provide three levels, one, two and three feet high. Parts cut from the panel were hinged to the main piece to for main support of the simple inverted V. Chains were attached to prevent the supports from opening, although there would be little tendency in this direction.

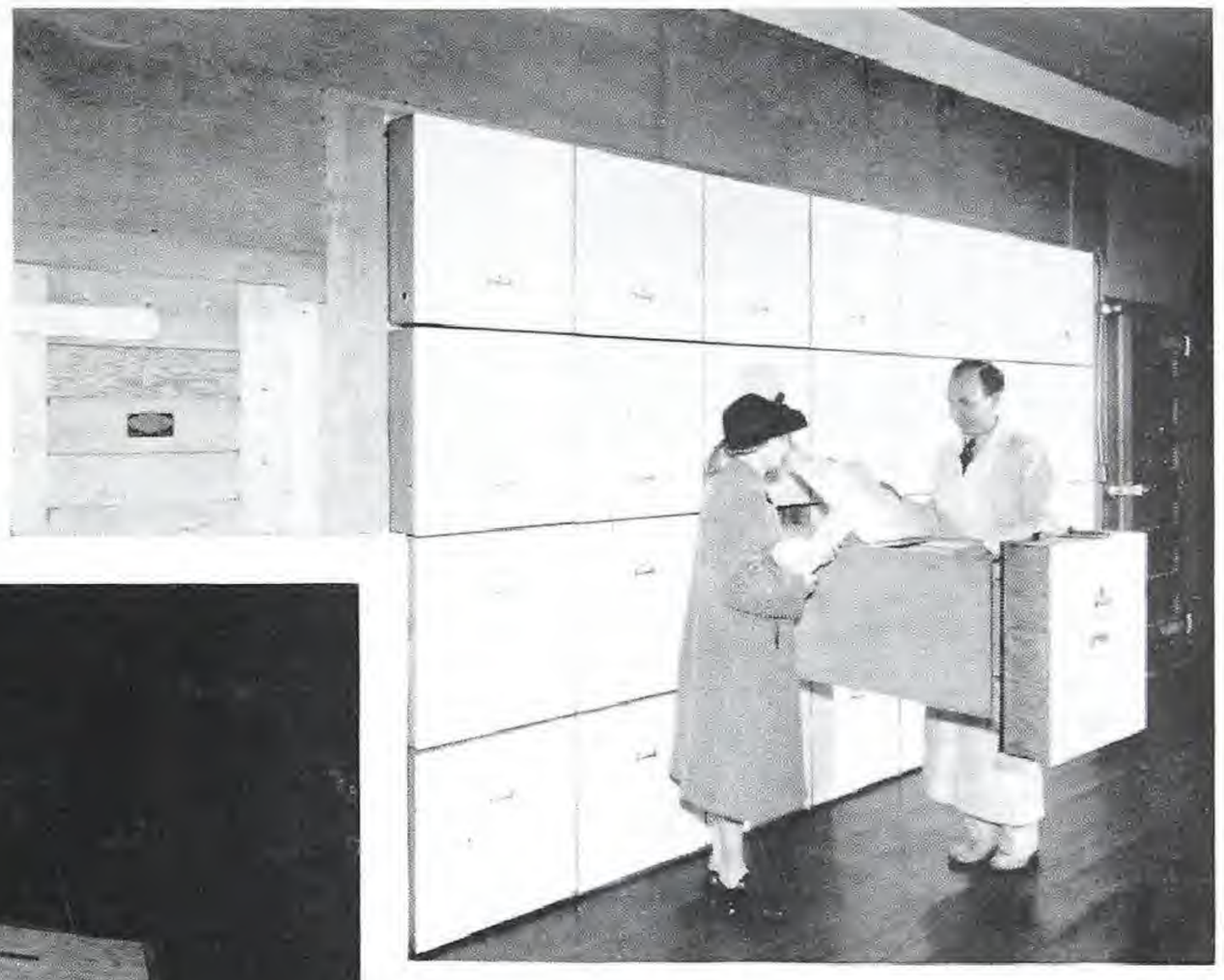
Then boards were merely laid across the bearings and the stage was set for taking four rows of soldiers—the front row of men standing on the ground and the three other rows on the bleacher.

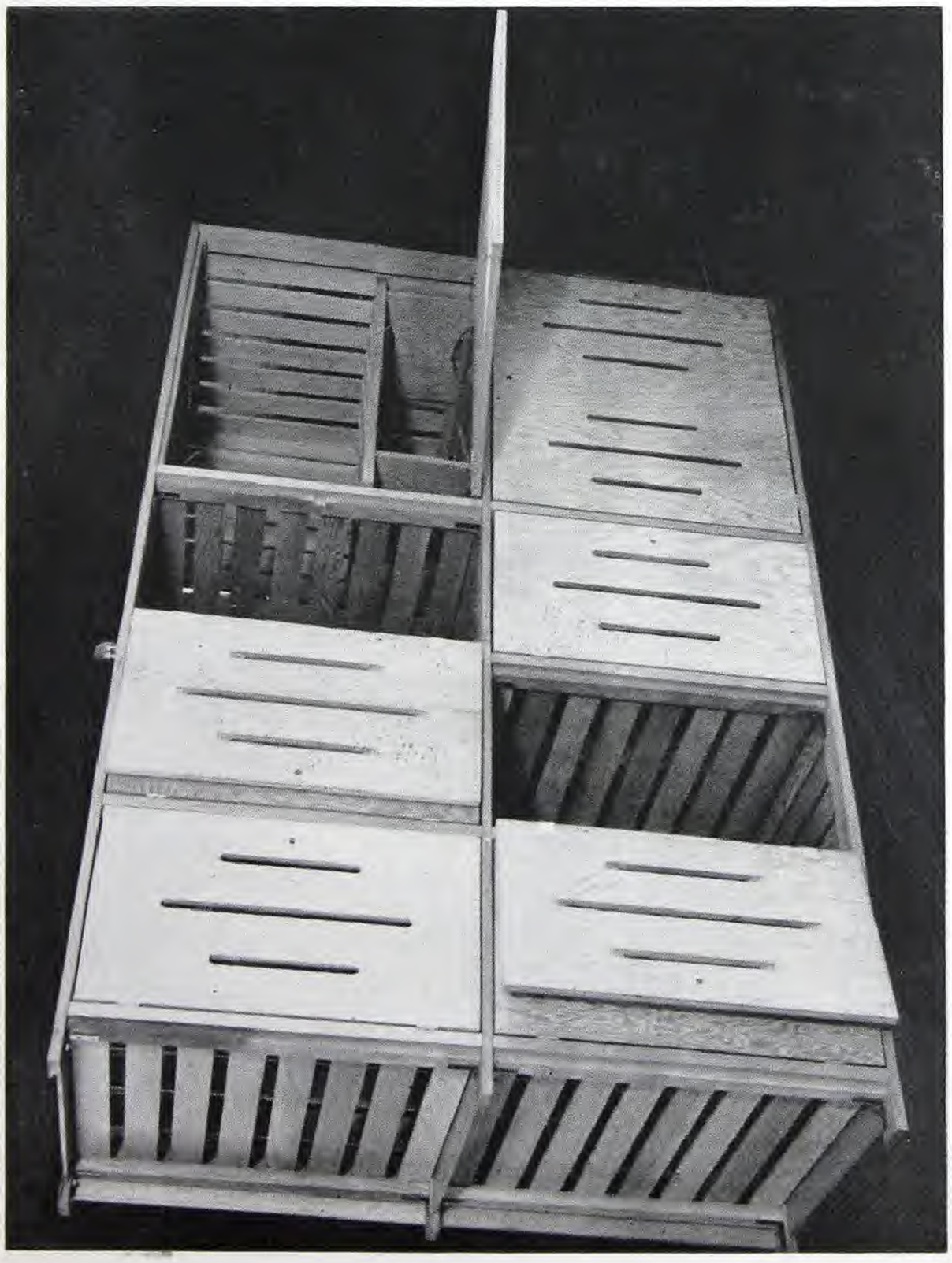
With eight-foot planks between supports, each unit was capable of posing 16 soldiers—four at each level. As a test before the bleacher was used, 8000 pounds of load was placed on each sections. Boards naturally showed some deflection but there was none in the plywood supports.

PLYWOOD IDEAL FOR COLD STORAGE BUILDINGS

Plywood does an attractive exterior job here as well as its insulating work inside.

Plywood, which because of its cross-banded construction with resultant freedom from cracks and elimination of the infiltration of free air and water vapor, is in its own right a highly efficient insulating material. Special adhesives developed for the purpose of gaining maximum performance under extreme low temperatures and varying degrees of humidity give plywood wide acceptance in the commercial refrigeration industry.





Refrigerated lockers for public use is a new business but one which is making great gains in popularity throughout the country. With the economies made possible through the use of plywood this offspring of the already vast cold storage industry is available to the small business man. The result is that nearly every average size community has or will have one or more of these convenient food storage places. A typical refrigerated locker enterprise is shown in the photographs above. Plywood was used not only for the insulating of the storage drawers and vaults but for the construction of the building itself both inside and out. Plywood display signs are in preparation now for use on this building.

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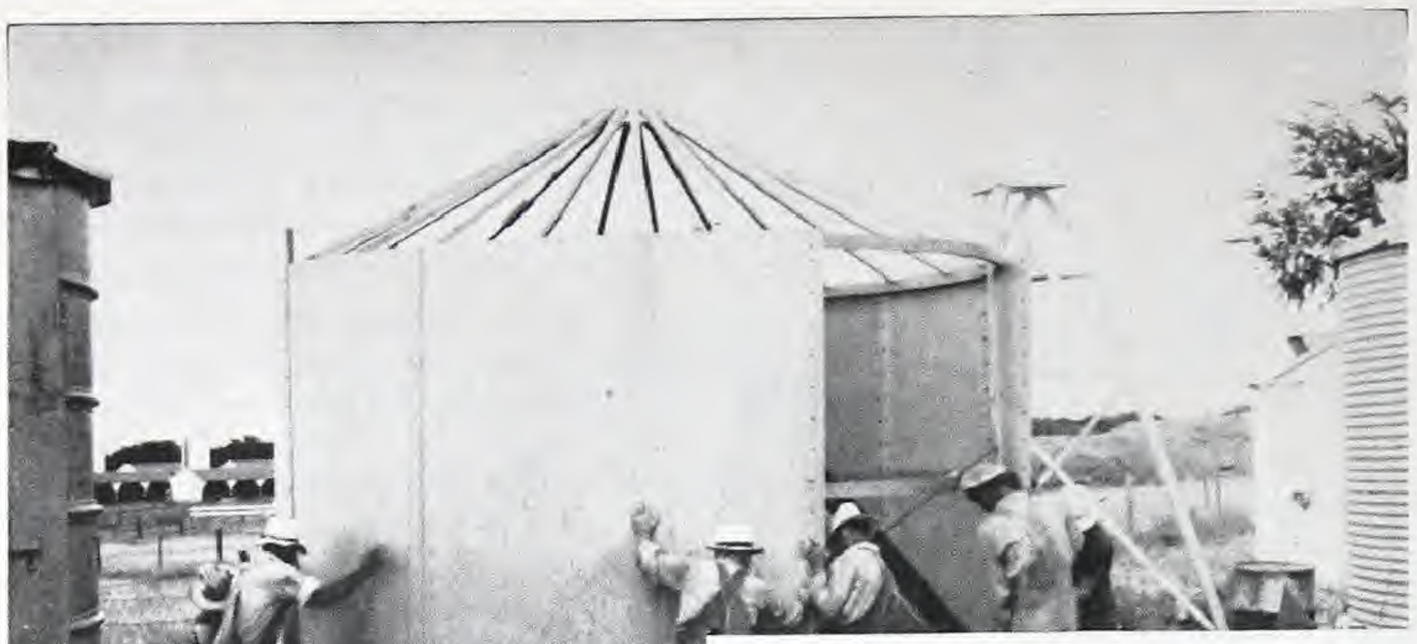
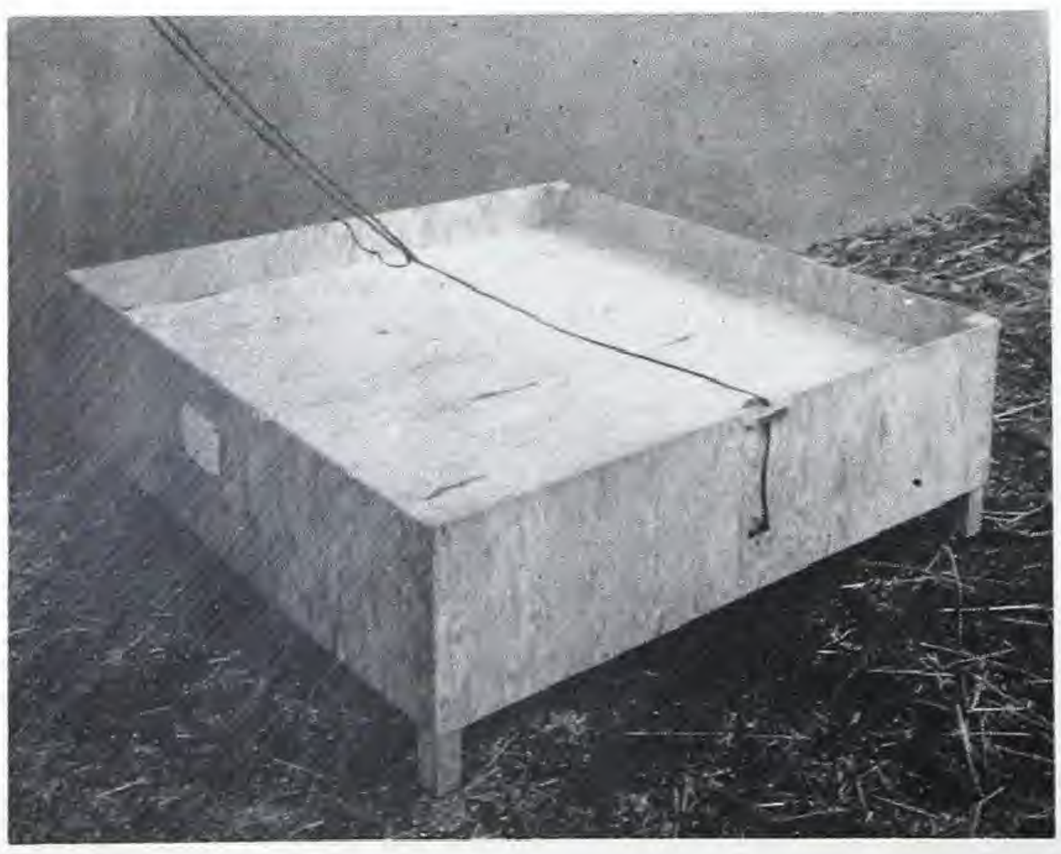
Another type of cold storage bin is shown at the left. The slotted doors and slat floors of these bins allow for free circulation of air which is necessary in the storage of certain perishables.

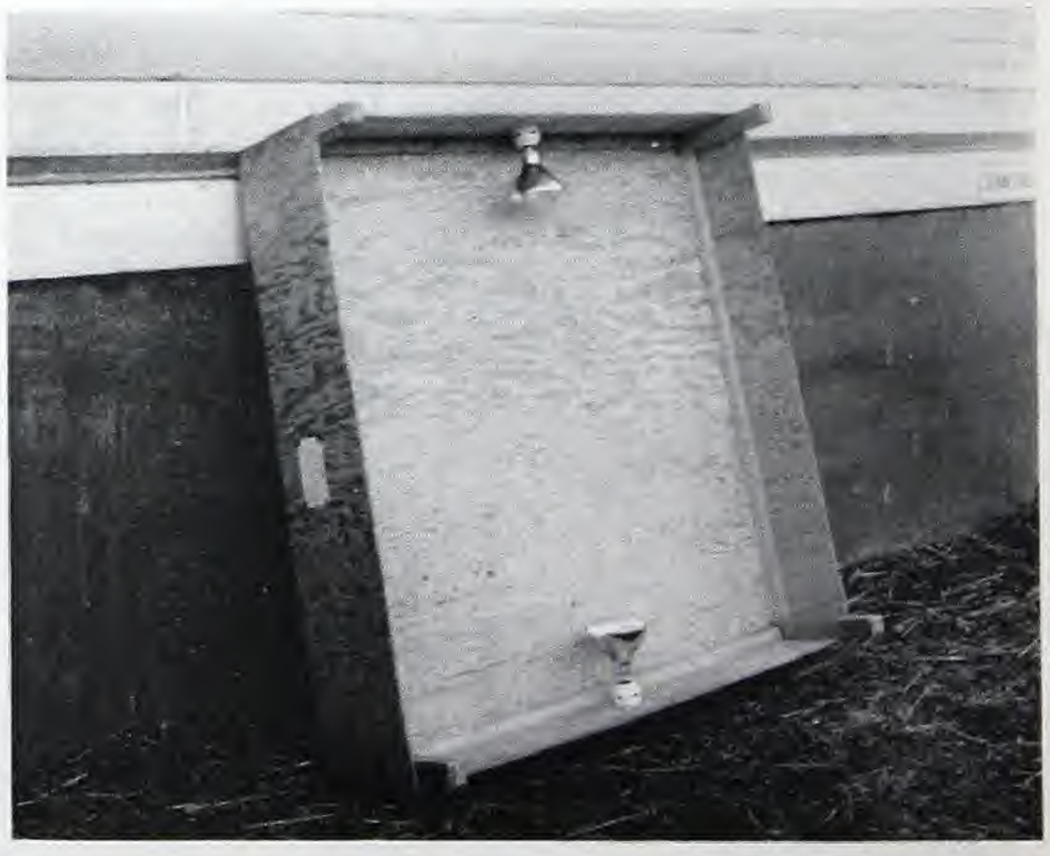
PLYWOOD FINDS NEW APPLICATIONS ON THE FARM



Grain growers, faced with the problem of storing last summer's surplus crop after elevators overflowed, made increasing use of portable tanks. Plywood tanks proved most effective means of maintaining temperature and moisture constants because of perfect sealing and damp-resistant qualities.

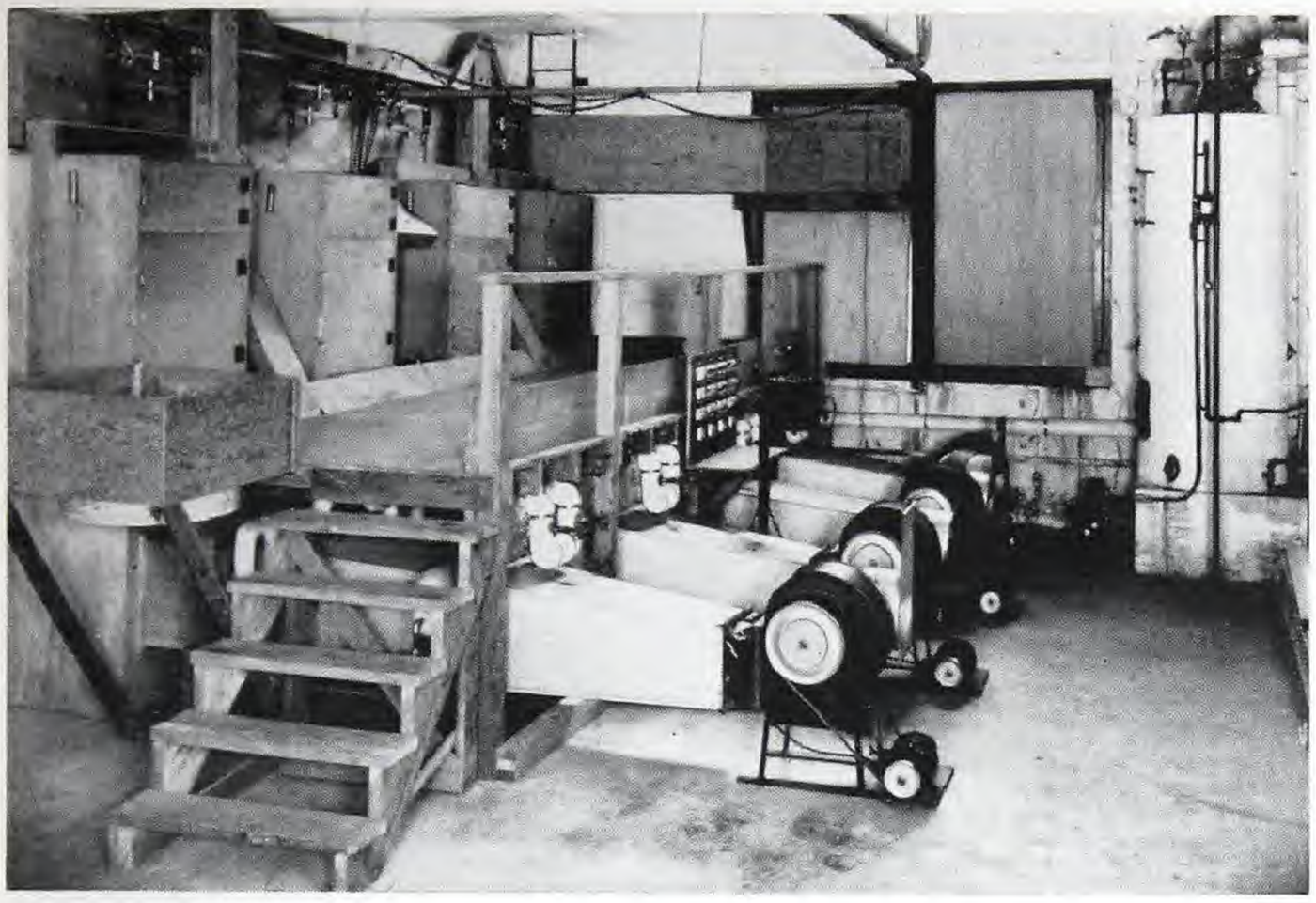
Ease and speed of construction during emergency made use of exterior grade plywood tanks doubly appealing to farmers. Side walls were simply made in flat sections with battens between panels. Entire wall was then wrapped around circular frame, secured, and ends were closed by insertion of separate panel.





Excellent heat insulating qualities of plywood plus simplicity of construction are features of this electric lamp brooding hover devised by Ohio Agricultural Experiment Station, Wooster, Ohio.

PLYWOOD KILNS FOR CROP DEHYDRATION EXPERIMENTS



This general view of the four dehydration kilns in experimental use in the Agricultural Engineering Department at Oregon State College show the possibilities of plywood for work of this sort. It is interesting to note that plywood panels were employed here to black out the windows of the experimental station.

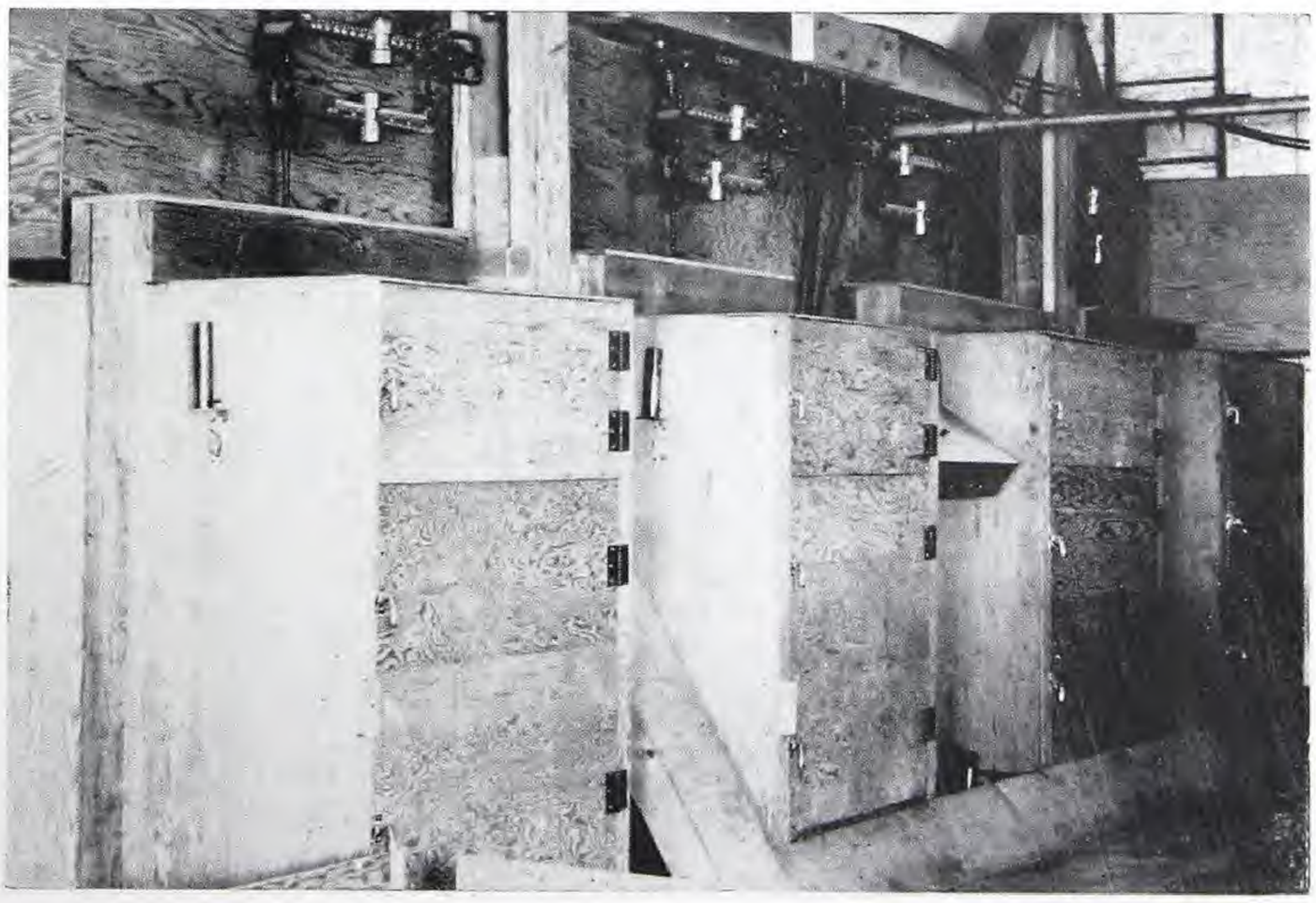
PLYWOOD is proving to be a very useful and important building material in a number of experiments conducted by the Agricultural Engineering Department of Oregon State College. Dehydration of farm crops has been one of the important phases of the work in which plywood has been used. Experimental dehydrators have been constructed with a minimum cost but with the greatest degree of durability, lightness and compactness.

Corn drying was the first research project which utilized experimental kilns, all of which were made of plywood. This resulted in the development of both ear corn and shelled corn dehydrators, which are being used on Oregon farms where corn drying is necessary. Special experimental kilns have also been built for the purpose of studying the most effective temperature and air conditioning for the drying of hops. All of the experimental kilns used in this project were made of plywood. Also, the larger kilns which have been built at the college for drying all of the hops from the 15-acre experimental hop yard are lined with plywood. These kilns operate with a forced draft system. Plywood works particularly well in this setup because it is easy to make the dryer air tight, thus preventing unnecessary heat loss.

Poultry house ventilation requires a certain amount of air ducts which can be cheaply and effectively built from plywood, as it is important that they be free from leaks. The small corner strip inside the duct provides a rigid member for gluing the sides and preventing air leakage.

Another use of plywood at the Experiment Station is developing with the new hay drying project. Again a large air duct is required to lead air into the hay mow under the hay, and plywood is very practical for the construction of the duct.

While there are many other similar uses for plywood, those listed above indicate their particular applications as associated with dehydration and ventilation studies.

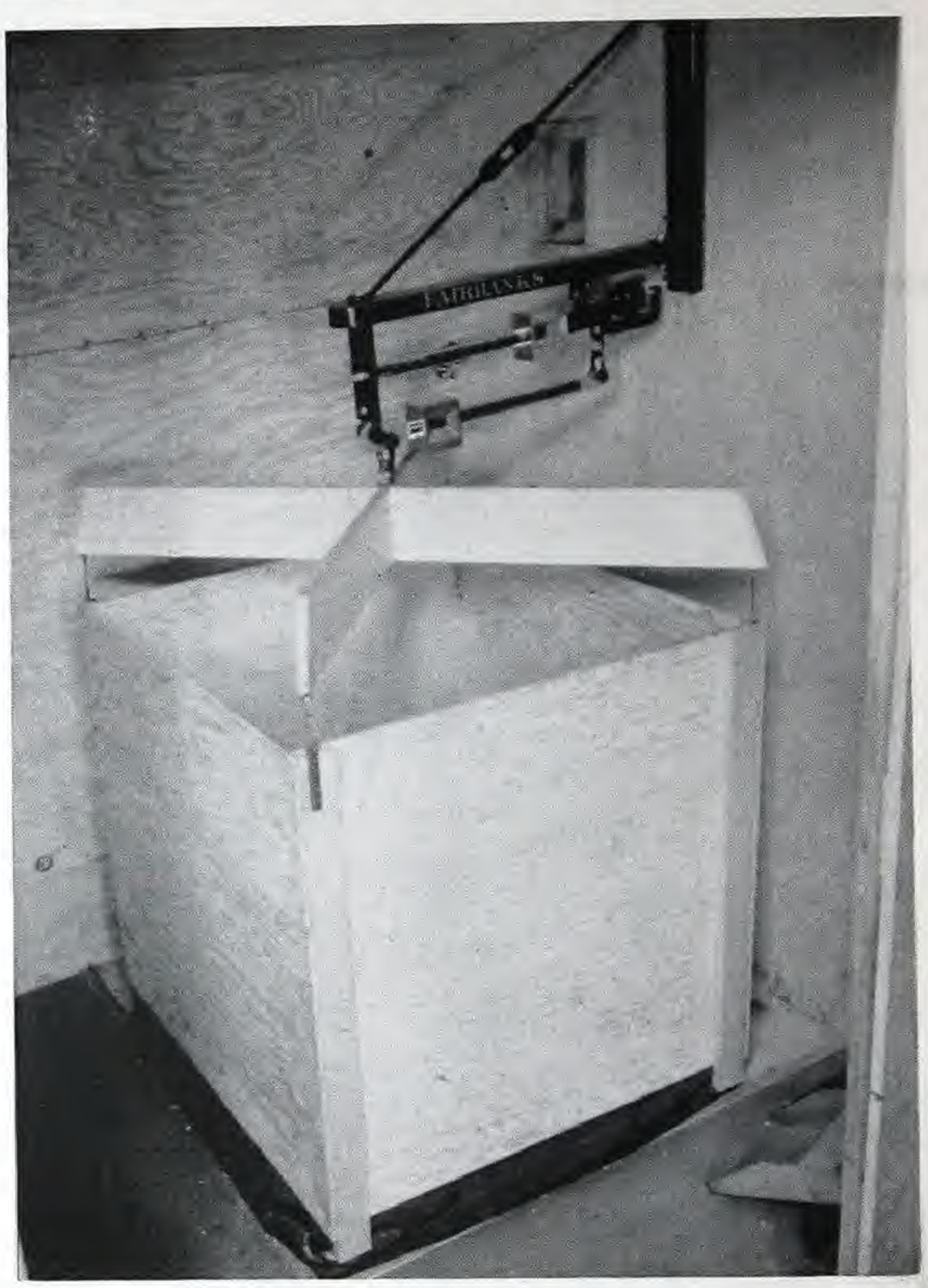


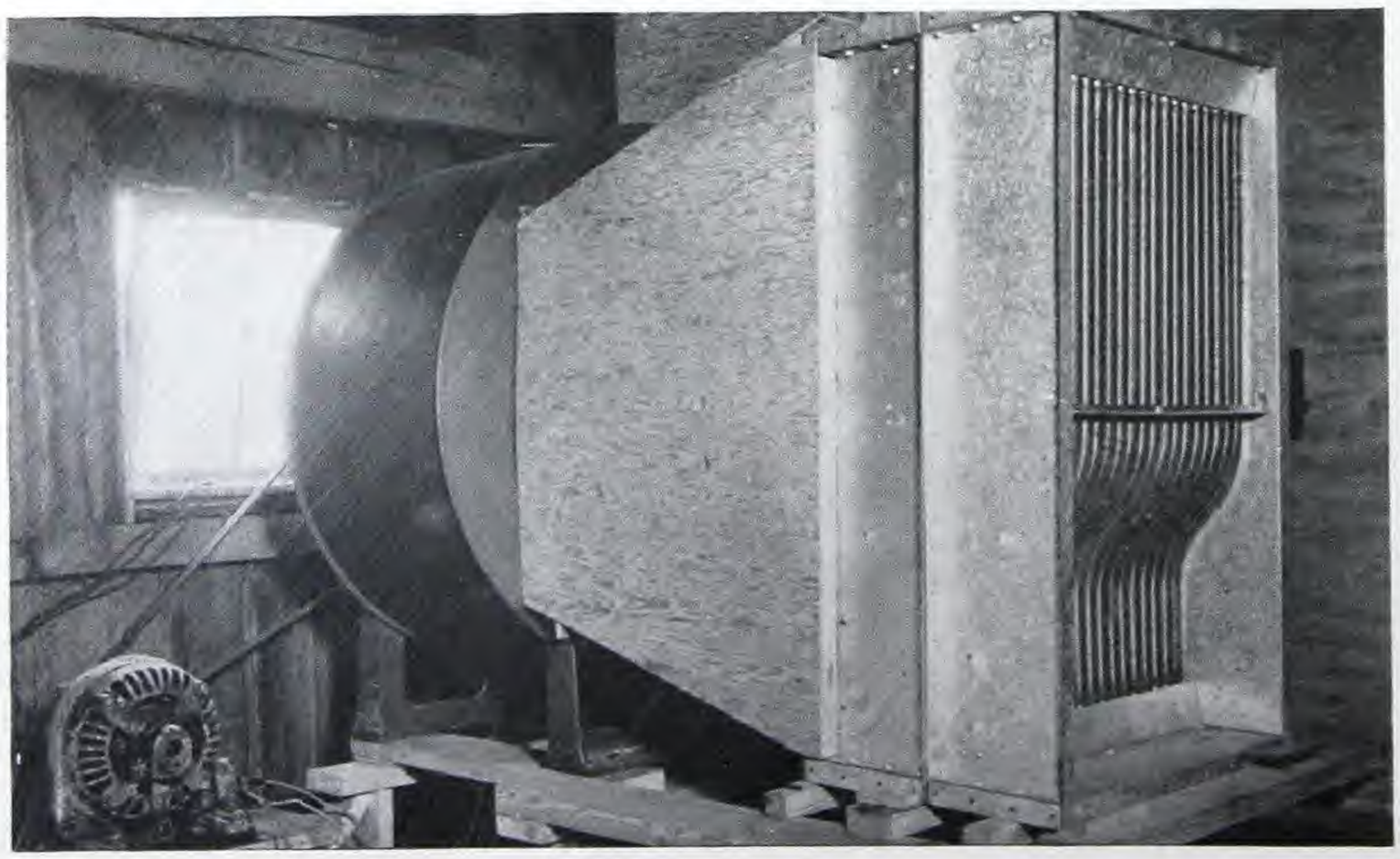
Close up view of the kilns shows the method of construction used. Several doors of plywood on each kiln make for ready accessibility. The beam scales assist in checking dehydration progress. Photographs were made by F. E. Price, Agricultural Engineer of Oregon State College.

PLYWOOD IN EXPERIMENTAL HOP DRYING EQUIPMENT

(ABOVE) This typical hop drying plant shows many possibilities for adapting plywood in its structure. Because of the moisture proof qualities of plywood as well as its low heat transmission level, it is an ideal material for farm drying and storing plants of any kind.

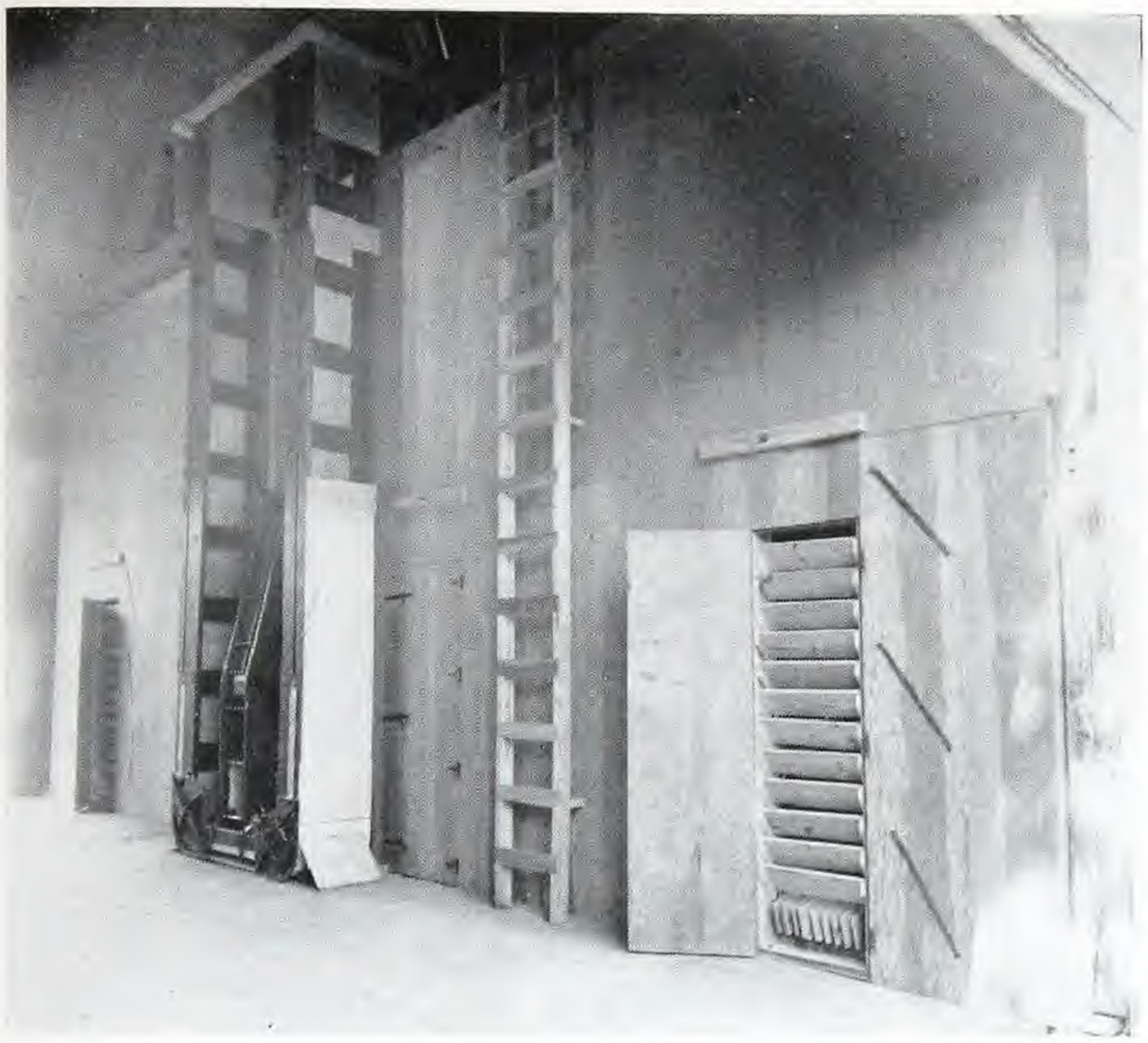
(RIGHT) This experimental hop kiln is made of plywood and is used in experiments dealing with the drying of hops at Oregon State College. Heated air is forced up through the kiln. Each kiln is suspended from beam scales, enabling the process of dehydration to be checked.



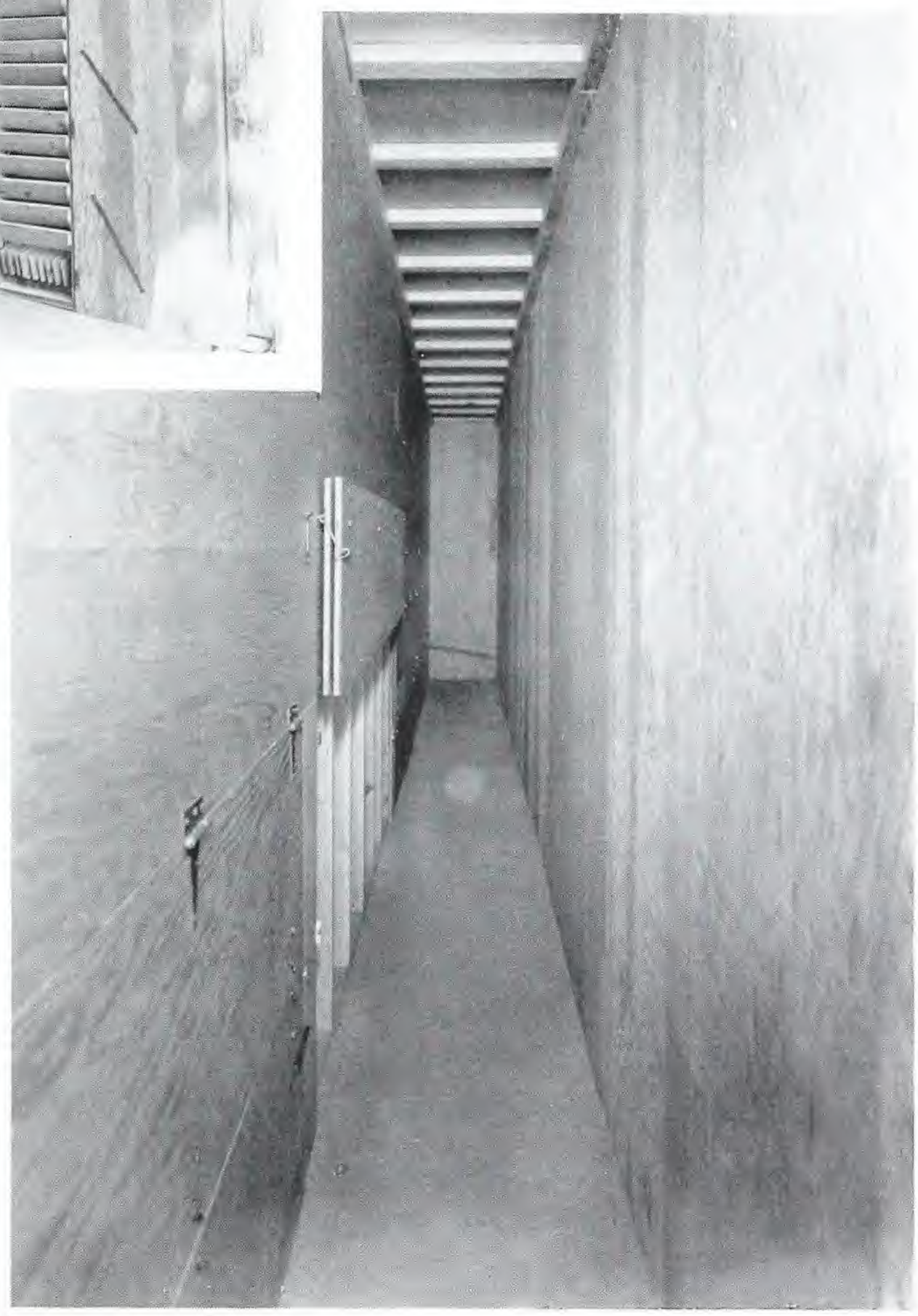


(LEFT) Plywood was used in this instance in making a hood to connect the fan and the heater for circulating heated air through a corn dryer in a seed house. This dryer is in operation on the farm of Byron Legg at Windfall, Indiana.

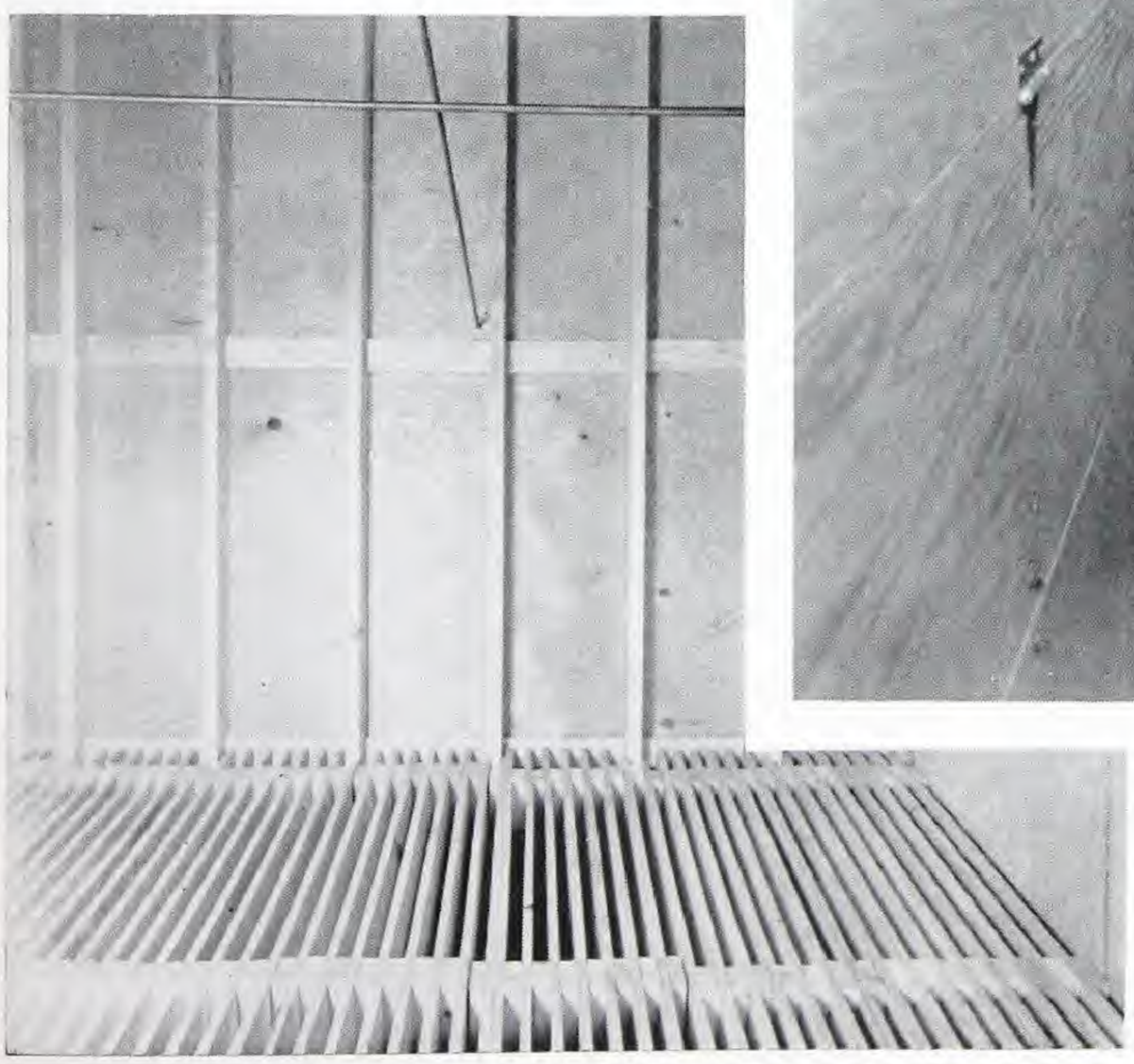
AIR TIGHT CORN DRYER BINS POSSIBLE WITH PLYWOOD



(Left) Exterior view of four bin corn dryer built with 7/16 inch, five ply exterior plywood. Plywood was glued to studdings and nailed with 6d galvanized nails. Mr. C. E. Troyer of LaFontaine, Indiana, owner of the corn dryer, says, "I would call plywood the perfect material for construction of drying bins, as it saves on the labor bill and makes the bins practically air-tight."

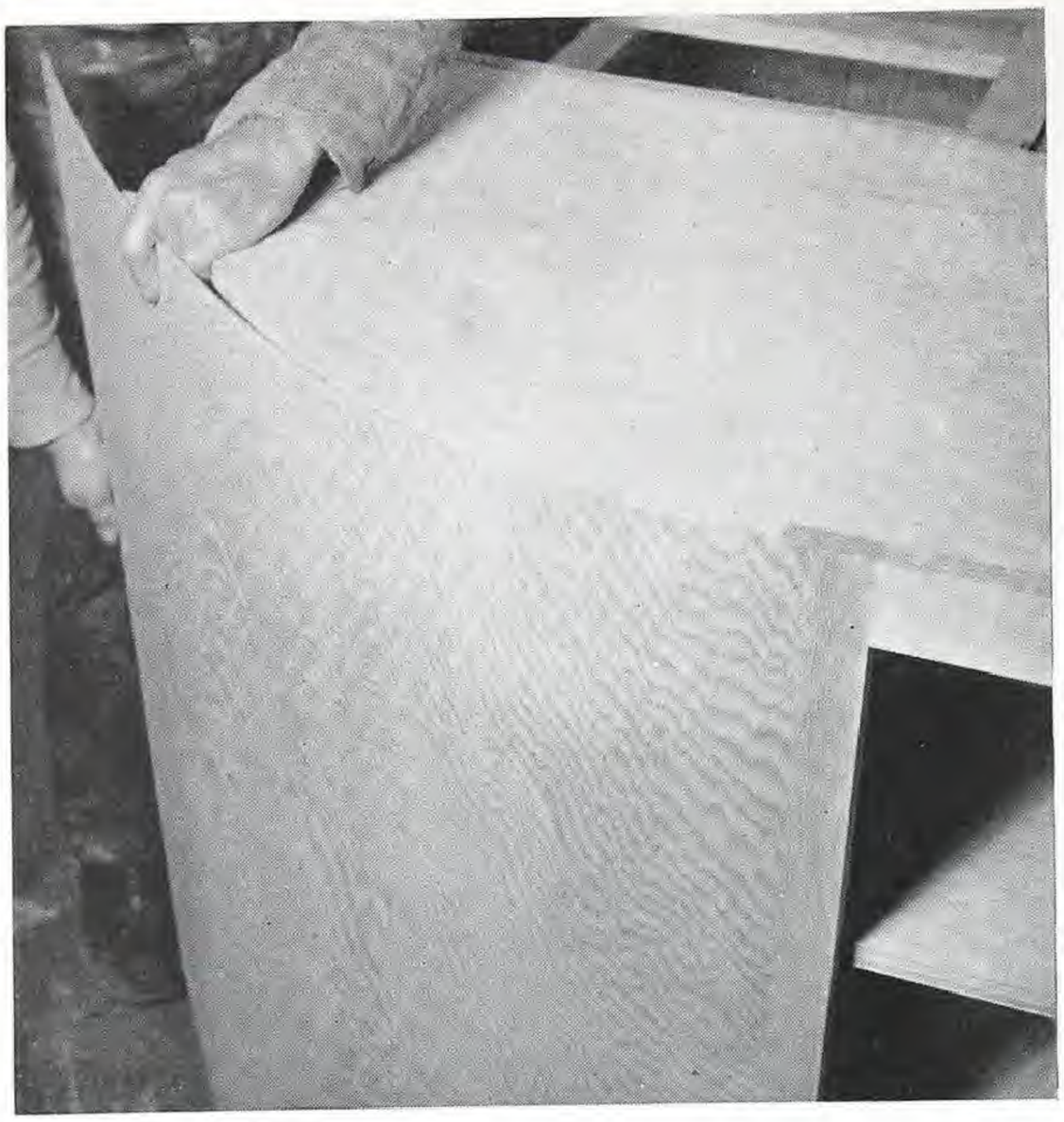


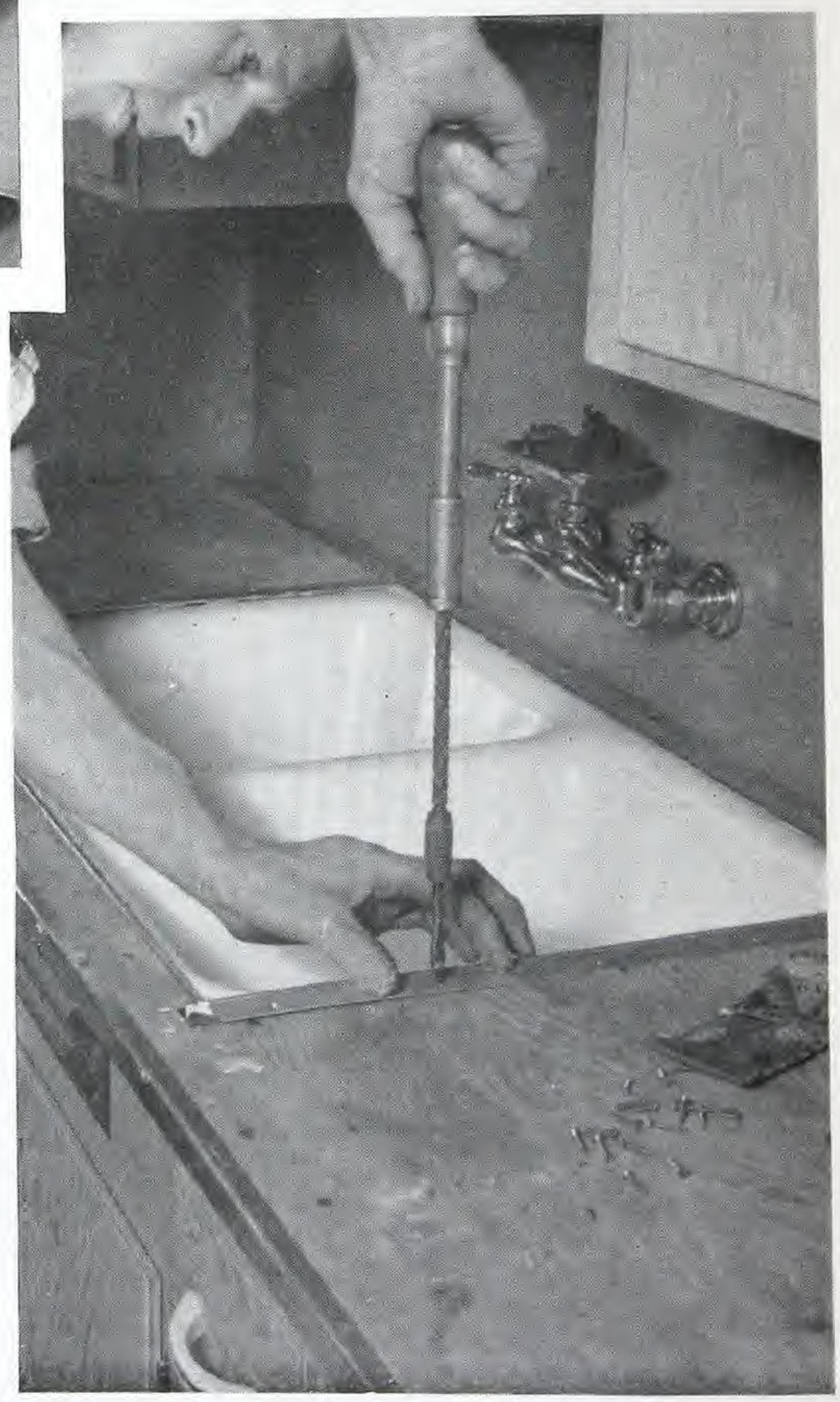
(Right) Interior view of ventilator or air duct at the base and rear of corn dryer. Each bin has a separate lift door. Concerning the sealing possibilities with plywood, Mr. Troyer says, "This is quite important as any leakage of the air causes a waste of fuel and power and increases the drying cost."



(Left) "If I were building a hundred corn dryers," concludes Mr. Troyer, "I would use plywood for the construction of the bins for all of them." Good evidence for his reasoning is shown here by the simplicity of construction and the obviously tight seam closures.

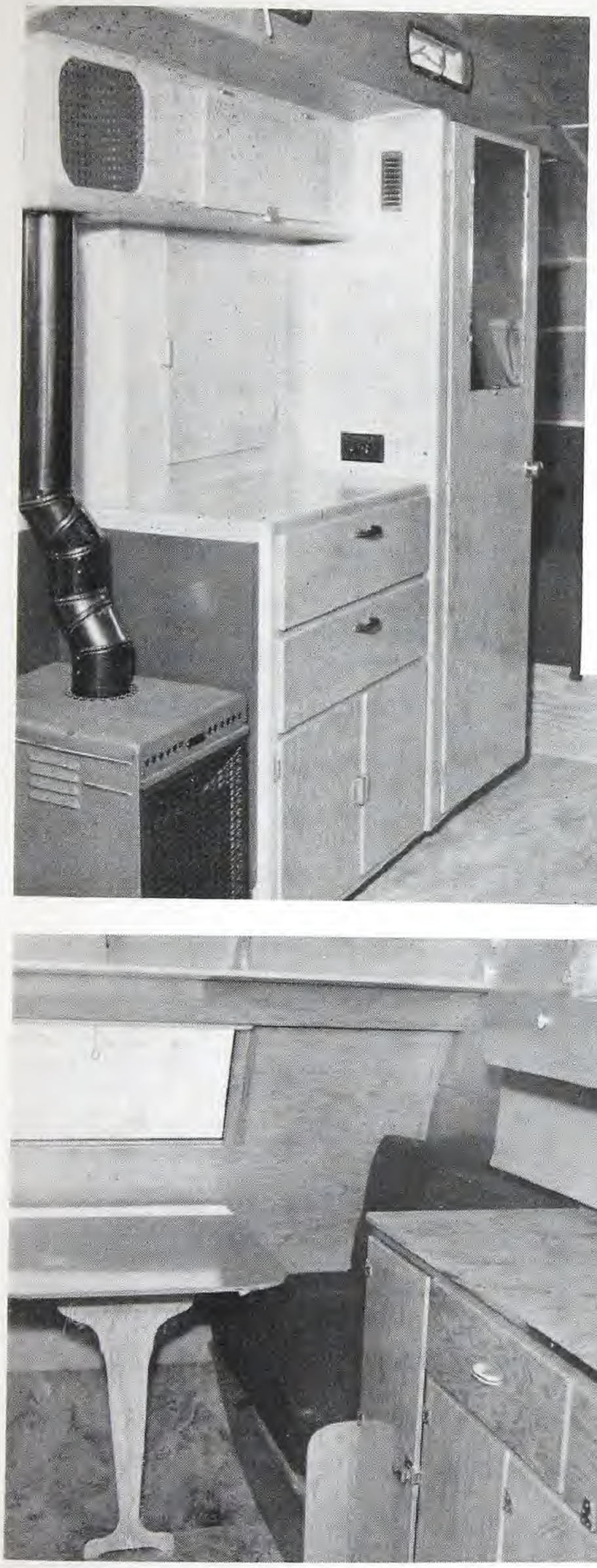
DOUGLAS FIR PLYWOOD GOES INTO THE KITCHEN

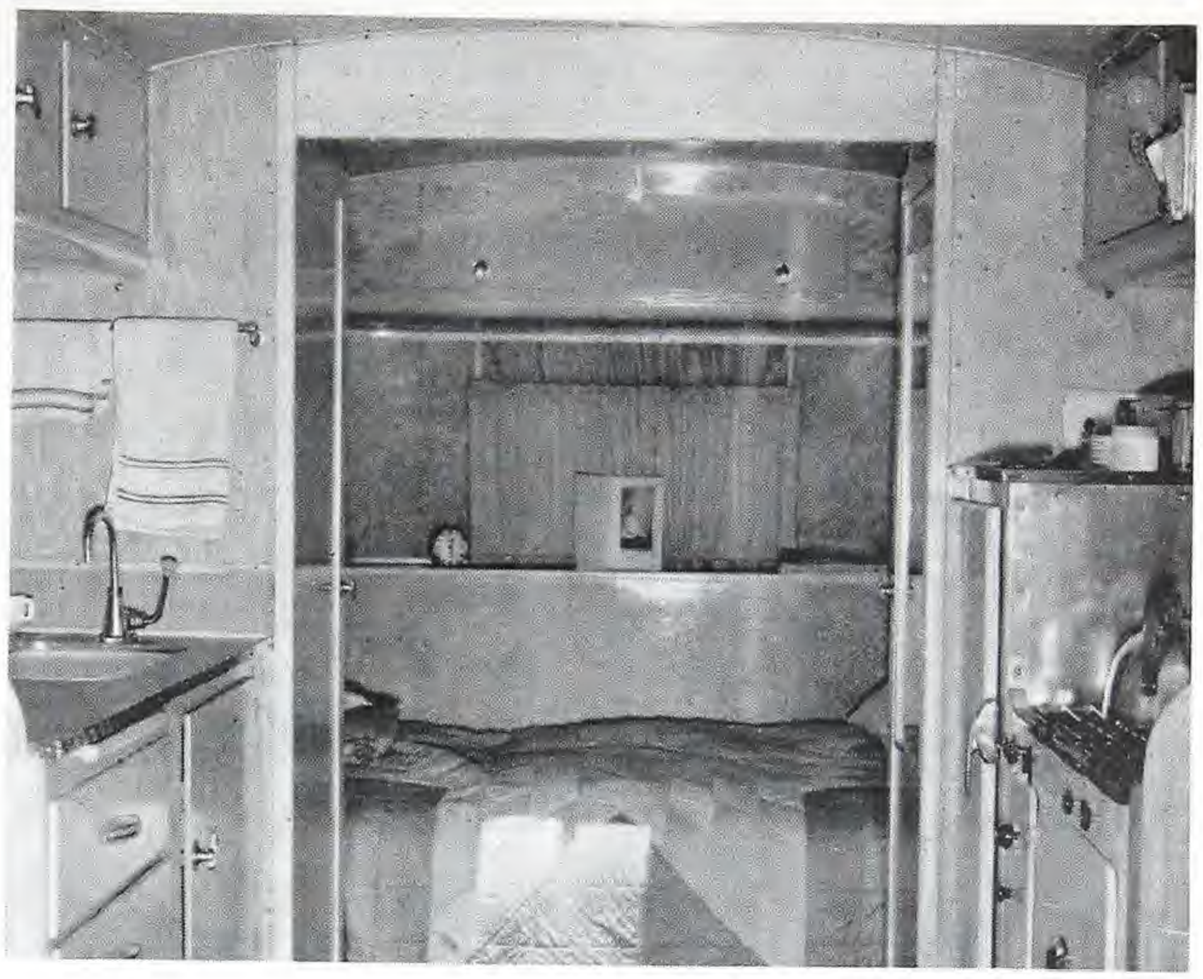


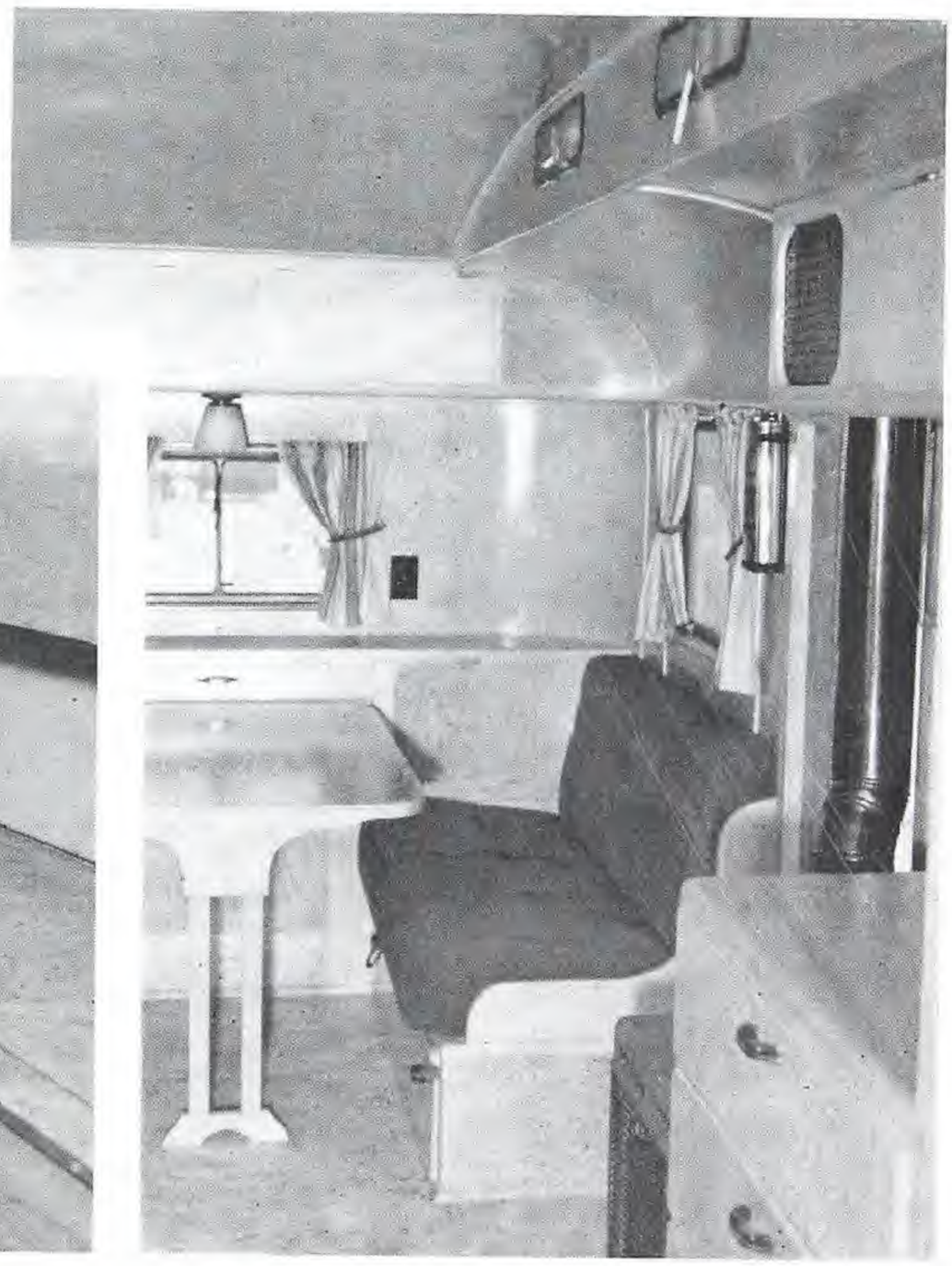


An interesting evidence of the practicality of plywood for the manufacture of built-in-kitchen equipment is shown here. In these cabinets which were built for the home of Mr. G. N. Arneson of Tacoma, Washington, 3/4 inch thick plywood was used for shelves and doors. The doors were routed 3/8 inch at the edge and half the thickness (3/8 inch) in order to provide the lip for the overlay on the cabinets.
At the corners the 1/8-inch plywood was used and two thicknesses applied to make the rounded surfaces. Framework around the corners was cut on a band saw.

PLYWOOD-BUILT TRAILERS FOR DEFENSE WORKERS



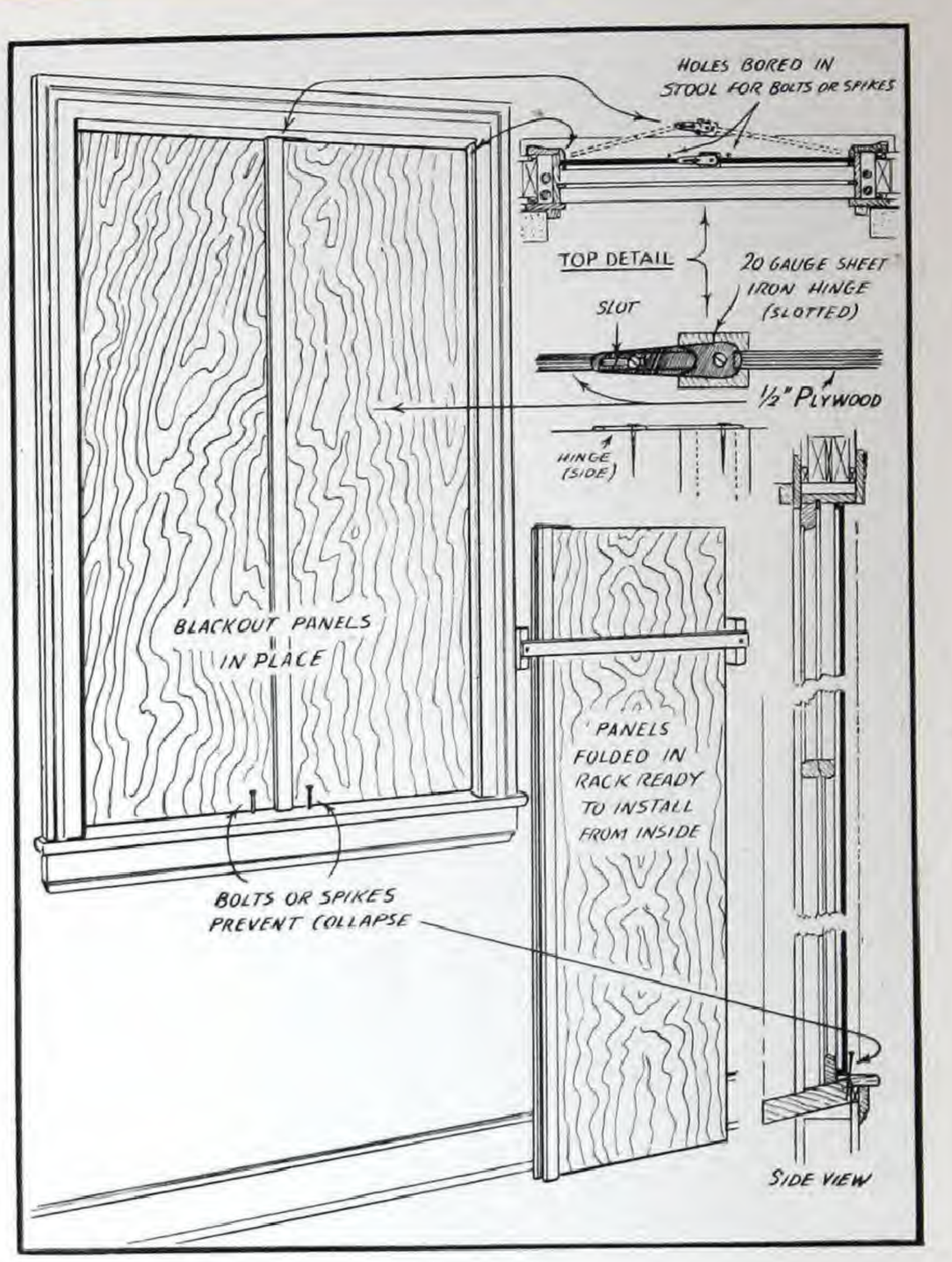




Trailers of the type shown here are being used by Farm Security Administration on 11 projects to provide housing for defense workers. Cost per dwelling unit with the trailer camps is $1084, including underground service utlities and camp's central utility building. The trailers which are placed 50 to the acre, are heated with gasoline stoves and are all supplied with electric current. Water and sewage facilities are located in the central building, which has hot water, laundry tubs, toilets, wash basins and shower. One central unit is built for every 60 trailers. The water supply is obtained from a municipal supply or from wells at the camp. Sewage disposal is handled by a connection to a municipal sewer or by a septic tank. Rents vary from $6 to $8 monthly, including light but not heating fuel.

PLYWOOD BLACKOUT SHUTTERS EASY TO INSTALL

(Above) With declaration of war, Tacoma, Wash., adjacent to Fort Lewis, became a news center. Blackout or not, the Associated Press men work on, behind plywood-covered windows.



(Right) Simple but ingenious blackout screens can be easily built for the home by following directions shown here. Means of storing are provided to make the screen instantly available in emergencies. The screens can be put in place quickly from the inside. Plywood is splinterproof.

A CURTAIN of plywood has been lowered around industries up and down the Pacific Coast to permit night production of vital war materials while blackouts are in effect to hide what would be targets for enemy bombers that conceivably could reach our shores.

Biggest plywood-for-blackout order taken during opening days of the war—and just as vital as any—was 233,000 square feet purchased to cover windows of the main plant of Boeing Aircraft Co. at Seattle, Wash., where the hard-hitting, four-motor bombers are assembled. Six different Washington plywood firms shared in filling the order, which called for immediate delivery.

With the covering of windows with the big panels, the material is playing a brand new role in the defense of the nation. There already has been established a long list of plywood defense uses, including everything from soldiers' lockers to barracks, pontoon bridges to patrol vessels.

Another noteworthy war installation of plywood, was that at Fort Lewis, where 40,000 feet of the panels were slipped into place to screen in night lights at mess halls, offices and utility buildings. These sheets were attached so they can easily and quickly be removed during the day, replaced during blackout times.

Meanwhile, every other 24-hour enterprise scrambled for blackout material and many managers looked to plywood as the answer, especially when the covering had to be removable. Newspaper offices, railroad dispatcher rooms, restaurants, the now all-important "little manufacturers," post offices and other governmental buildings—all have placed the big panels over windows.

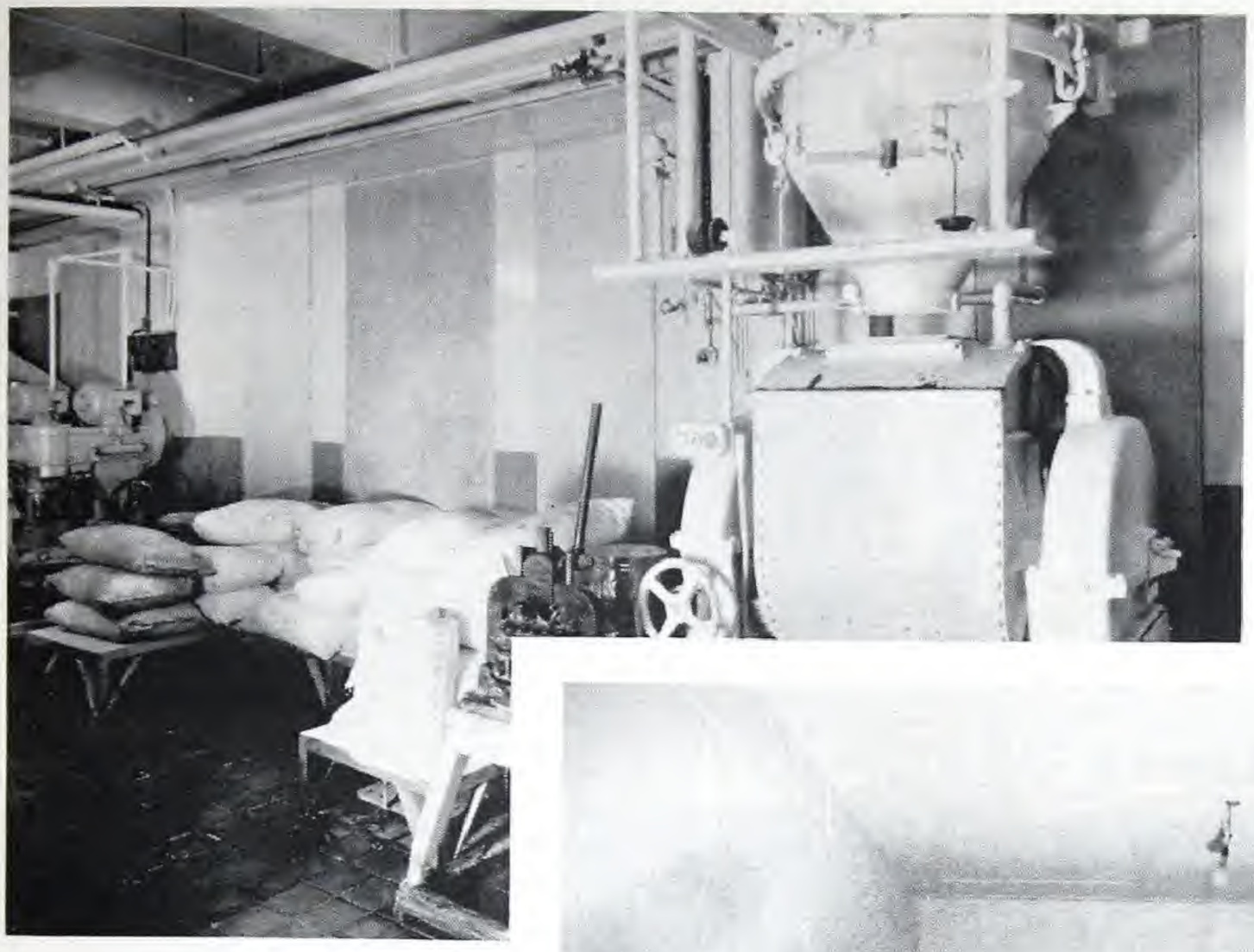
USUALLY the 5/16-inch Plyscord (sheathing) grade or ¼- or ⅜-inch Plywall (wallboard) quality are used. As these grades are manufactured for interior use, they are placed on the inside of the panes and usually overlap the casings. (Whenever plywood is placed outside the windows and is to remain exposed to the weather for an indefinite time, only the exterior (waterproof) type should be used.)

In industrial plants small nails are driven into casings to hold the panels. Where the sheets must be removed, various ingenious methods have been followed. Probably the installation most effective is that of nailing a narrow furring strip on each side of the casing and placing turnbuckles near inside edges. Then the blackout panel can be slipped in place and held there by the latches.

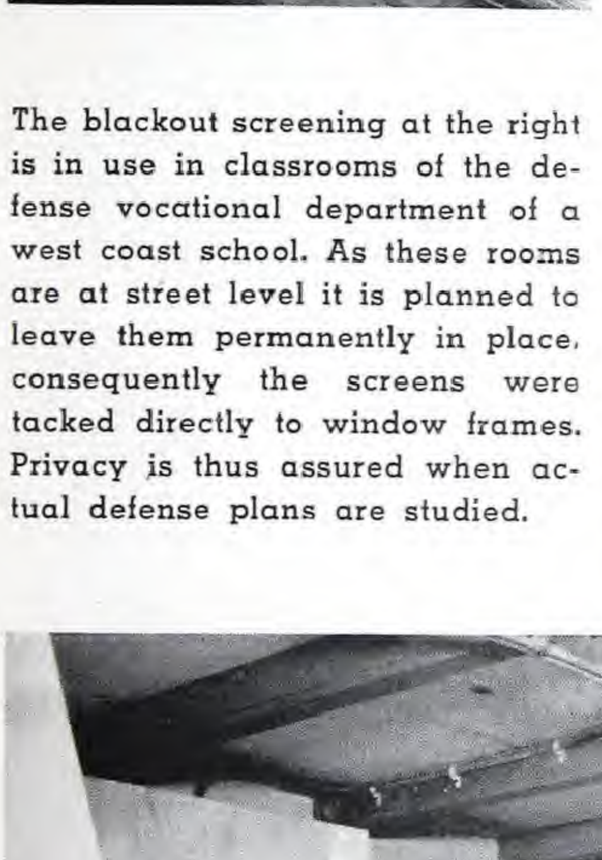
Blackouts brought up a brand new problem around the home, too. And here again the big, rigid panels have been applied in innumerable instances. In fact, lumber dealers have reported heavy aggregate sales for the purpose. They point out that plywood has double value because it can be re-used for dozens of household needs after the emergency.

First rooms to be given the "treatment" were kitchens and bathrooms, because these are necessity-rooms in the morning.

PLYWOOD BLACKOUTS EASY TO APPLY



Blackout makeshifts of the first several days of national emergency have given way to many more ingenious devices, some commercial, others home made. The greatest problem was for industries, especially those doing defense work, requiring 24-hour operation. Photograph at left shows the method used by the baking department of a large western department store.



The blackout screening at the right is in use in classrooms of the defense vocational department of a west coast school. As these rooms are at street level it is planned to leave them permanently in place, consequently the screens were tacked directly to window frames. Privacy is thus assured when actual defense plans are studied.

At left is another room in the same school. This illustrates a method for admitting sufficient air while allowing for split-second closing in the event of an alert signal. Panels of stiff material such as plywood or fabricated wallboard have been found most acceptable for blackout purposes because of easier handling both during and after manufacture.

HOW TO BUILD A DISPLAY SIGN WITH PLYWOOD

1. Two thicknesses forming the letter are nailed together. Back letter is 1/4-inch narrower to receive side strip.

2. Letters are nailed and screwed together with hot dipped galvanized fastenings. Offset must be uniform all around.

3. Side strip, or thickness apron, steamed or soaked to permit bending, is next nailed in place.

4. Joints are drawn up tight against the back block. Waterproof glue and hot-dipped galvanized nails are used.

5. Assembly, sanded smooth, is ready for the sign craftsman. Minor blemishes may be filled with any good plastic.

6. Nail holes and imperfections are thoroughly caulked. The letter is now ready for priming coat and finish.

PLYWOOD AND PAYLOAD

IN THE trucking business, it's pay load that counts! And that simple statement explains why more than half of the 55 moving vans and freight trucks of McLean the Mover, Inc., of Tacoma, Washington, have bodies of Douglas fir plywood.

A carefully prepared chart shows that one of his newer moving vans with body of plywood weighs exactly 7025 pounds fully equipped with ropes, padding, etc. That truck has a carrying capacity of five tons or 1200 cubic feet—enough to move all the furniture in the average five or six room house.

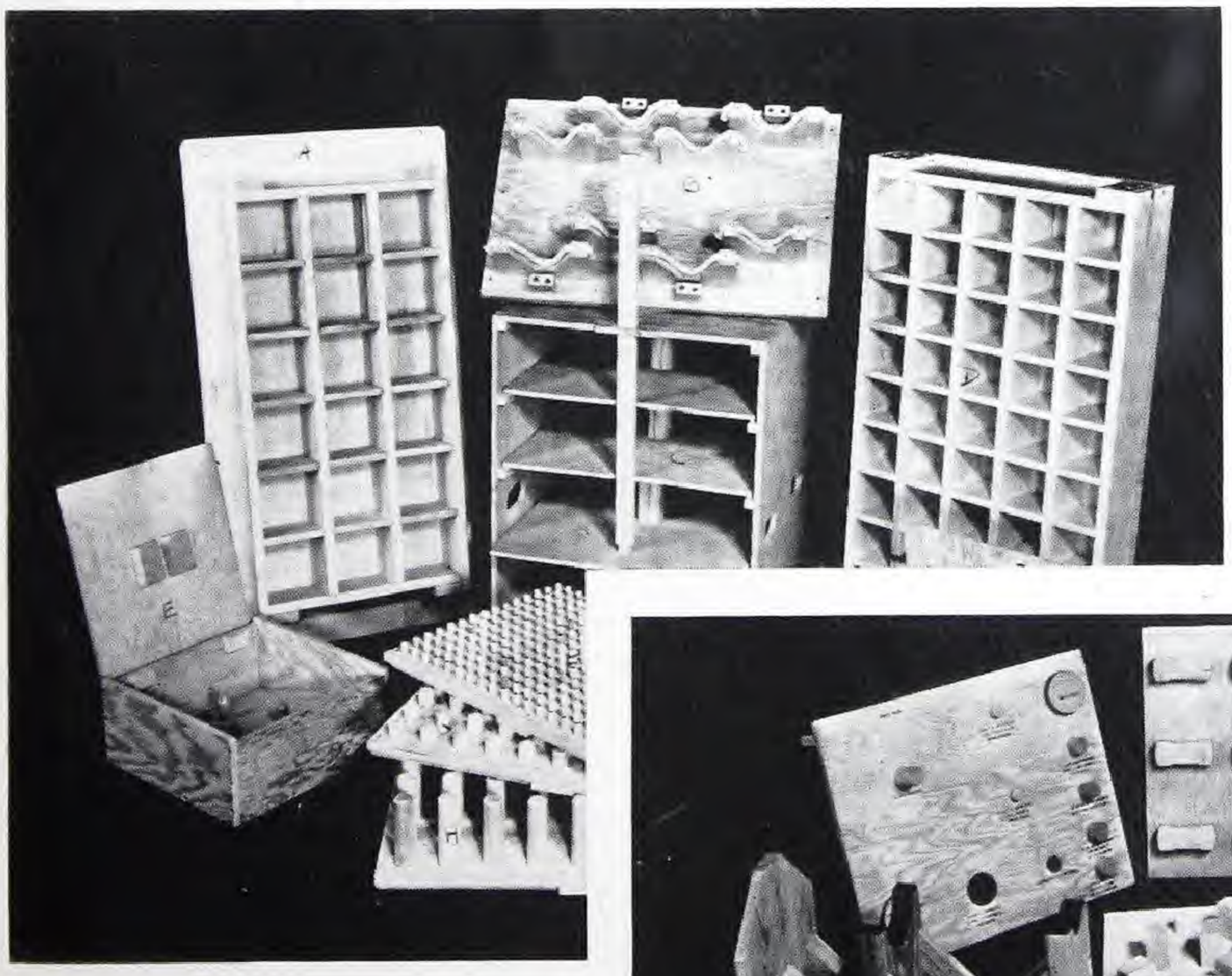
Down the list there is another truck of the same chasis, same wheel assembly, same motor—same in every respect except the van body is timber and steel instead of plywood. The weight of the truck totals 10,400 pounds. That 3400 pounds is an all-important factor. It means that more than a ton and a half of extra weight must be carried to the exclusion of paying freight. It slows down the truck, especially on hills, increases gasoline, oil and upkeep costs.

Then there's another interesting little matter. The license structure for trucks in most states is rather complicated. For instance, a license for a truck (with load) weighing under 20,000 pounds may be about $50. License for a truck over ten tons often may be as high as $150 (These figures are purely comparative). Therefore, the tax or license fee for the heavier truck—but carrying only the same load—would be several times that of the lighter vehicle.

Mr. McLean adds another item in favor of his plywood-built trucks. He lists the original cost of the paneled van at "appreciably" lower than that of a steel and timber body.

There are long years of experience behind his claims for the panels of wood and glue for his trucks. One carrier, built of plywood back in 1929, has a carrying capacity of five tons or 1000 cubic feet. The plywood panels have turned in admirable service. And that truck was constructed prior to the advent of exterior (waterproof) plywood bonded with synthetic resin adhesives akin to bakelite. Now, of course, only the exterior type is used in these highway freight carriers. Usually the ¼-inch panels are used. No special framework is required; painting is simple with a sealer and two coats of aluminum paint.

ASSEMBLY BOARDS AND BOXES FOR AIRCRAFT INDUSTRY



Another of the endless variety of uses for which plywood is being used in the cause of national defense is this collection of plywood items used for assembling and shipping airplane parts.

Special attention is drawn to the construction of the boxes in these photographs. Obviously intended for heavy usage, plywood was a natural selection for this system of packing.